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EDITORIAL NOTES—GAS, &c.

Municipal Trading in St. Marylebone.

THE possession of a municipal electric light undertaking appears to have an extraordinary power for seducing from the paths of sound finance and fair business methods some of even the best of our municipal administrators. If ever one would have thought one might look with confidence for sound, sober, straightforward administration of local affairs, it would be in a Council such as that which directs the municipal destinies of the Borough of St. Marylebone. Here, councillors are not little men of no status in the world of affairs—not men of the two-pound-a-week stamp that we find administering the ratepayers' thousands in many a London parish, but men at the head of big and successful commercial undertakings, men prominent in the clerical, medical, legal, or architectural professions, men who have earned distinction in the camp or on the quarter-deck. Here, surely, one might have expected to find the business of the Municipality conducted with a single eye to the ratepayers' true interests.

Yet what do we find? A while since, we had the spectacle of the Marylebone Borough Council first of all inviting tenders for the lighting of Oxford Street from their Electric Supply Committee and the Gaslight and Coke Company; then receiving a report from the Lighting Committee recommending the acceptance of the Gas Company's tender; next allowing the Electric Supply Committee to amend their tender; and finally deciding upon electricity for lighting the street—the Gaslight and Coke Company very properly having declined to enter into a pre-judged competition in tender-amending with the Electricity Committee. Result—the Marylebone Council have the most expensively lighted thoroughfare in the world, without a penny profit accruing to their electric supply undertaking.

Now, however, as will be seen from the account given elsewhere, the Council have gone—or rather we should say, for (by a majority of 19 to 17) a halt has now been called, were going—much further down the slippery slope of municipal preferential trading. The Electric Supply Committee in Marylebone, finding business none too booming—what with metallic filament electric lamps on the one hand and incandescent gas-lamps on the other, to keep down the output of current—cast envious eyes on that (at a fair price) desirable customer, the public street lamp, which in every thoroughfare in the borough, except Oxford Street and Regent Street, is at present fitted by one or more incandescent gas-burners. The Committee accordingly suggested to the Council that they should be allowed to take over and convert to electric lighting the lamps—about four-sevenths of the whole—situated in all the streets in which their mains run. The Council very properly appointed a Special Committee to consider and report upon this suggestion. But now mark what happened.

Under the circumstances, what would one who had no prior knowledge as to the history of municipal trading in Marylebone have expected? Surely, that such a Committee would have been composed of a few of the soundest business men on the Council, having no connection with the Electric Supply Committee and none with the Gas Company, before whom representatives of both these undertakings would have been called, and who would have invited proposals from both undertakings upon which to base their decision and report. What, however, in fact happened was that the Special Committee appointed comprised as a majority of its members the Chairman and two members of the Electric Supply Committee; that no communication was ever addressed by the Special Committee, nor was their appointment notified to, nor was any proposal invited from, the Gaslight and Coke Company; and that, without any reliable estimates of either initial or subsequent costs being furnished them, the Committee recommended the Council, on the ground of a hypothetical saving of £168 a year and a hypothetical improvement in lighting of 2½ per cent., to instal tungsten lamps of nominal 40 and 50 candle power in place of No. 4 Kern gas-burners in 1964 lamps!

Considering the composition of the Committee, this recommendation was perhaps not so surprising as it was audacious. But what was really startling was to find that, having had little or no time to consider the proposal, and no adequate particulars on which to judge of its soundness, the Council should, at the first time of asking, adopt it by "a large majority." Such is the extraordinary power of the municipal-trading virus to cloud the judgment and warp the otherwise undoubted business integrity of some among the very best of our municipal administrators! Fortunately for the reputation of the St. Marylebone Borough Council, the prompt steps which were taken by the Gaslight and Coke Company to protest against, and expose, these discreditable tactics have led (as will be seen elsewhere) to the question being re-opened, and to the scheme being, for the present, suspended—only, it is hoped, to be finally destroyed as an unsound, costly, and unsatisfactory proposal. We can only hope that, if the wiser counsels do not finally prevail in the Town Hall, or are not enforced upon the borough by the County Council, the Gaslight and Coke Company will give such publicity to the municipal trading methods which have been adopted against them in Marylebone, as will ensure for those responsible for their adoption, as they will deserve, the condemnation of all who have regard to the honourable conduct of public affairs.

Technical Support of Coalite Finance & Commerce.

COALITE LIMITED—the progenitor of the British Coalite Company, whose affairs were under notice last week—are clever in their advertisement campaign. Certain leading daily newspapers last week published over three columns of the report of the meeting of the parent Company, which was held on Monday; and we know full well that these newspapers are not in the habit, in the ordinary conduct of their journalistic enterprise, of giving any such prominence to the affairs of a commercial undertaking. Such an unusual report was intended to serve a purpose; and possibly the purpose on this occasion was to make the best possible use of Professor Vivian B. Lewes as an "advertising" medium. Professor Lewes was put up to make a speech at the meeting, to bring comfort to the shareholders and to inspire the confidence of the public, who will, at an early date, be asked to subscribe to half of a new creation of 50,000 £1 ordinary shares—money, as was seen by the proceedings at the British Coalite Company's meeting last week, being badly wanted to assist the parent Company in paying its way, and to discharge a portion—and only a small portion—of its financial obligations to its offspring. Possibly for the first time in his career, Professor Lewes found himself reported in one of the leading morning papers *in extenso*, and in all the glory of the "first person singular"—a distinction that, in such a paper, without something very special has transpired before the report appears, is usually confined to Kings, to Princes, to Prime Ministers, and to such-like.

Professor Lewes did not have anything to tell the shareholders about the merits of coalite and about the "wonderful" bye-products that are realized by the process of low-temperature carbonization. These would have been the very topics upon which it would have been delightful to have heard our old friend. Instead, he diverted attention from these matters, on which the commercial value of the process depends, and proceeded to paint with his usual deftness pretty crests to the heavy waves forming the existing coalite position. High-sounding adjectives were plentiful. The shareholders were told that "enormous" progress has been made during the last eighteen months. Something as to what that "progress" amounts to in respect of carbonization has been sketched in these columns from time to time, ending with last week. "The property, too, is much more

"valuable to-day than it was at the time the parent Company "was formed." So it ought to be, in view of the amount of money that has been spent, but upon which expenditure there is as yet no return, and no immediate prospect of there being any. Then, again, "your financial outlook is "practically unique." And there were loud cheers. How words, mere words, please the coalite shareholders! We will not, however, quarrel with the statement, as perhaps Professor Lewes is right about the uniqueness. The proceedings of the British Coalite Company a few days before lend colour to the assertion. That Company hold as security, in connection with the underwriting by the parent Company, a mortgage on all the foreign "patents" of Coalite Limited, and £250,000 of the deferred shares which were to be handed to the latter in payment for the patents. There is also interest accrued to the British Company, under agreement, on calls in arrear on shares held by Coalite Limited, to the extent of £11,400; and part of the money to be raised by the issue of new shares is to be used for clearing off some of this back interest. If Professor Lewes, with the range of language at his command, chooses to describe this financial outlook as unique—well, so be it. One more point from the comforting and confidence-inspiring speech under review. "The moment the British Coalite Company came into "existence," we read, "it was able to put up large plants "at Wednesfield and Barking for making coalite." That is an exaggeration—judging by the statements made by the Chairman of the British Coalite Company a few days before, and by what subsequently appears in Professor Lewes's own speech, as published. The British Company may have been "able," but did they put up "large" plants at Wednesfield and Barking the moment they came into existence? The Professor was present at the British meeting a few days previously; and, if his recollection does not play him false, he will remember that the Chairman, with deliberation, explained that it was a good thing they did not build "large" plants when they came into existence, as those plants, to secure the economy and other advantages of later improvements, would now have had to be scrapped. The units of plant at Wednesfield and at Barking, according to Professor Lewes, are each only "dropping" some 36 tons of coalite per day, and the plant at the Plymouth Gas-Works is expected to account for another 100 tons a day!

A great deal was said at the meeting as to the new retorts that have been made for producing coalite, which simply consist of castings weighing over 2 tons each, through which there are a dozen 5-inch boreholes for containing the charges. Professor Lewes had much to remark, though nothing very definite, as to the marvellous results that are to accrue from this particular improvement—indeed, Coalite Limited "now possess an apparatus of which he does not "know the equal." For the making of a given volume of gas, it occupies "a less space, it occupies a less time, and "it uses less fuel in the carbonizing than any other apparatus "that I know of, including the Dessau or vertical retorts, "which are the latest thing now in Continental gas manu-"facture." These are matters that can be critically examined when hereafter we get the exact working figures from carbonizing, at a temperature of 800°, in the dozen boreholes through the 2-ton blocks of iron; but Professor Lewes knows perfectly well that relative space and fuel consumption are not the only matters that the gas engineer and administrator have to look to in working for the companion ends of a technical efficiency and a commercial success. The speech was a clever composition of unsubstantial and still unsubstantiated statement. The substantiation can only come through the Company's balance-sheet. But what was said pleased the shareholders in Coalite Limited, and so the speech served one of its two purposes—the other being served when the reports of the meeting were published in the newspapers.

Just a few words regarding the coalite patents; and that is the only point in the address of the Chairman (Mr. J. H. Smith) to shareholders of Coalite Limited, to which it is worth while to pay any attention. It is part of the policy of the Company to make much of their patents, and to buoy-up the faith of the shareholders in the monetary value of what they possess by a reference to the protection that has been secured in Germany, America, and this country. On this occasion, the Chairman told the shareholders that since 1902 the search of the British Patent Office authorities has been of a far more rigid character than formerly, so that no patent is now granted unless the subject is "abso-"lutely new," and has never been "anticipated." The Coalite Directors ought to know better than to suggest that acceptance by our British Patent Office is tantamount to a certificate of indisputable validity. The British patent authorities, we venture to assert, are not omniscient. Their search into novelty and anticipation does not, and cannot in most things, extend beyond the records of the Patent Office. Much in long past years has been done in gas-works in low-temperature carbonization and in the use of iron retorts of various sizes and shape that has never been the subject of patent; so that the expressions "absolutely new" and "not "been anticipated" as applied to certain of the operations of the coalite system should, in some degree, be discounted by that which apparently is not within the knowledge of the Patent Office. It is also stated that letters patent have been secured in thirty-three of the principal countries of the world, while in twenty-seven the applications are still under consideration. This is of interest, as is also the statement that Coalite Limited is not, nor was it ever intended that it should be, other than a promoting Company. But the foreign patents being held, as it were, as surety by the British Company for the large amount of undischarged underwriting, Coalite Limited are not apparently altogether free masters of these foreign patents, on which non-technical men set such an immense value. However, the value has yet to be proved commercially. The plant at the Plymouth Gas-Works is looked to to produce a great triumph. After all the labour in the Public Press and at meetings, it will be a terrible blow to the shareholders if the issue is only a mouse. There is also a considerable amount of confidence in the air that the tender of Coalite Limited will get through for the installation of the process for the production of gas for the supply of St. Petersburg. In the weeks between December and March (when a decision is expected to be arrived at by the St. Petersburg Municipality), there is time for many slips, and time, too, for the spread of knowledge.

Woodall-Duckham Settings for Burnley.

BURNLEY was one of the first towns in the country to adopt (on the initiative of Mr. J. P. Leather, the Corporation Gas Engineer) the inclined retort system of carbonization; and the town has never had cause to regret the choice made. Now Burnley is going to be the first to adopt, on the large working scale (the trial settings at Poole and Nine Elms on the latest design having given complete satisfaction), the Woodall-Duckham continuous system of carbonization; and again there is no fear, the advice having come from Mr. Leather, that Burnley will have any occasion to regret the choice. It is a plain and practical business proposition that was introduced to the Council, and that the Council wisely accepted. The installation comprising the present scheme will consist of nine beds of four vertical retorts, and, comparing the working of these with an inclined installation of equal productive capacity, there will be a gain on coal and labour, less residuals, of £12 a day, or 2·1d. per 1000 feet of gas. Now £12 a day multiplied by the number of days' working in a year will represent a considerable sum to be placed against a capital expenditure of £10,800. The town councillors will see from this that it does not require any special technical knowledge to grasp the financial importance of the proposal.

In arriving at the estimated saving, Mr. Leather's figures are interesting. To do the work of the thirty-six vertical retorts, he calculates that 108 inclined retorts would be required; that a production of 1,350,000 cubic feet of gas can be realized from the former by carbonizing 113 tons of coal, as compared with 129 tons of coal carbonized in inclined retorts. There in the cost of coal is the first gain, through, it is easy to compute from the figures, the superior yield per ton by the continuous process of about 1500 cubic feet of gas. The next saving is in wages; but those who are concerned for the interests of labour will agree, on consideration, that anything that cheapens gas production, and so assists in developing business, also broadens the base of employment—if not within the works, outside. A comparison of the money paid now and (say) before inclined retorts were installed for service rendered in the gas business at Burnley—taking it from beginning to end—would prove the point. Looking next at the residuals in the calculation, the lessened quantity of coal carbonized, of course, gives smaller quantities of coke and tar for sale; but Mr. Leather takes no credit for any additional value for the coke, but claims an increased market value of 5s. per ton for the improved tar. From the smaller quantity of coal, a yield of 31 cwt. of

sulphate is reckoned upon, against 30 cwt. from the larger quantity carbonized in the inclined retorts. From the experience with vertical retorts, confirmed time and again, it may be conceded that these estimates, if they err at all, do so on the safe side of moderation.

This installation at Burnley comes at an opportune time; for, under working conditions, we shall have concurrent operation of the installation of sixty Dessau retorts that are to be put up at Sunderland and of these thirty-six Woodall-Duckham retorts at Burnley—the one intermittent, and the other continuous, operation; and there will not be such a great difference between the productive power of the two installations that the working data cannot be accepted for comparative purposes. Details of the Sunderland settings are not yet available; but if it is computed that the productive capacity of each retort will be about 15,000 cubic feet per day, the sixty retorts would account for a production of about 900,000 feet per day; while each of the Woodall-Duckham retorts will yield 37,500 cubic feet of gas per day, aggregating from the thirty-six retorts the 1,350,000 feet. The conditions should therefore enable one to form a very fair judgment, under normal conditions, as to which—the 25 feet retorts and continuous working, or the shorter length retorts with intermittent operation—is the more economic manufacturing system for British requirements. It is an interesting decision at which the Burnley Town Council have arrived; and we congratulate both them and Mr. Leather upon it. It again indicates the confidence of the governing body in a technical adviser who has proved himself fully worthy of it.

The Dearer Coal Bill.

THE Coal Mines (Eight Hours) Bill has been finally dealt with by Parliament; and the question will now be at rest—at any rate, for a period. Since the objectionable measure first made its appearance, it has been subject to a great deal of onslaught, but very little defence. While the whole country, as represented by trade and industry, has been raising its voice against the measure, only the voices of the parliamentary sponsors have been heard in its support; and their one monotonous, wizened-looking tale has been wearying to both the flesh and the spirit. The House of Lords have listened to the country, and shown their contempt for the despicable bending of the knee by the Government to Baal, as represented by the Miners' Federation, whose political power the Government are loth to underestimate and much less to reject. The House of Lords would have done better still had they declined to be parties to the first step in the degradation of labour by imposing on the individual a statutory restriction as to how he shall dispose of his labour, and to the laying upon hearth and home, industry, and all that tends to the nation's prosperity, a further and an unnecessary burden. The House of Lords would not have been censured by the country for completely sparing it this burden and indignity. But the House did the next best thing. It did something—and something very substantial—in blunting the edge of the instrument with which it is proposed to inflict the injury. Not only outside Parliament, but in both Houses and in Committee, the Bill has been mauled in a manner that shows how discomposed was opinion over the measure. But obduracy and a big majority won, to the point permitted by the Lords.

By their amendments (which the Government and their prompters, the Miners' Federation, agreed to accept last Friday), the Lords have continued the Bill as an eight-hour day one; but the day is to be an eight-hour one excluding the windings, and not including them as was proposed by the Government. Which means that the day from bank to bank will be about eight-and-a-half hours. What the Lords have made permanent is precisely what the Government had proposed should have duration for a quinquennium, after which there was to be an eight-hour day from bank to bank. The importance must be conceded of the extra half hour per day, when applied to the year, and to the whole of the colliers of the country. It represents on the original proposal an extension of the statutory period of work in mines by about 6·2 per cent. But is the matter likely to rest here? That will depend entirely upon the party returned to power at the next General Election. If anything like the present composite majority exists at the end of the five years from the new Act coming into force, the whole question may be revived. The Government claim that they will then be justified in reconsidering the question, and taking any constitutional steps they think proper to effect the restoration of the measure to the shape in which it stood at the time it was sent up to the Lords. This indicates a hopeful view that their confiscatory and burdening legislative programme will have commended itself to the country. The Miners' Federation, too, through their President, have already announced that they are not going to let the matter peacefully stay where it is now. Minatory suggestions of this kind will not do the Government the slightest good; and, looking at the menaces in the most amiable mood, they can only be characterized as the evidences of pusillanimity. The Government emulate the schoolboy who, having been punished by one of his fellows, threatens with "You wait and see what I will do." Very well, we can only hope for the best. The time that lies before will enable the country to get some approximate notion of what will happen if an eight-hour day from bank to bank takes the place of the eight-and-a-half hours of which we are soon to have experience. Of this there may be a fair amount of confidence, that, by the end of five years there will be such a marshalling of forces against any further restriction that it will have to be an extraordinarily strong Government and coherent party who will defiantly set themselves against the expressed opinion and will of the country.

There will now have to be a partial revision of views as to the effects of the measure; and in regarding these effects there are several considerations to be brought under review, though necessarily no definite statement can be framed by the application of the uncertain elements of speculation and estimate. The Act is to come into force on July 1 next for all parts of the country, except Durham and Northumberland, to which counties it will apply on Jan. 1, 1910. Thus any holders of contracts containing a clause for an increase in the price of coal upon the Act coming into operation, will now know how far they will be affected. But there was talk of the increase of contract prices being 1s. 6d. per ton under this clause before the period of grace was adopted during which the eight-hour day was to exclude windings and before the Lords made the exclusion permanent; so that the 1s. 6d., under the changed circumstances, should be subject to some abatement. During the parliamentary progress of the Bill, it was constantly averred by the Home Secretary that the fears as to the results of the measure were merely the phantoms of excitement and agitation. At the twelfth hour, he himself—perhaps unconsciously—confessed that there was something more substantial at the back of the fears engendered by the Bill. It will be noticed that Durham and Northumberland are to have a longer time in which to prepare for the change. Remember the Bill has been transformed to an eight-and-a-half hour one; but Mr. Gladstone gives us a reason for the extension of time for the two far-north counties that the whole of the coal industry there will have "to be reconstructed from top to bottom." The reconstruction of an industry cannot be done for nothing. Moreover, the costs of administration and working at the collieries directly attributable to the Act will not be in any way diminished by the variation from inclusion to exclusion of the windings. The impositions upon the working at the collieries remain intact in the measure. Increased cost there will, therefore, inevitably be as a consequence of this vicious piece of class legislation; and it may be said with absolute confidence that, though there has been the gain of half-an-hour in the working period, the statutory limitation of labour will be the excuse for increasing the prices of coal beyond the legitimate additional costs of working.

What has been accomplished through this purely socialistic measure is only the beginning of something that will lead the country into a great unknown morass in connection with labour. There is not a single good point that can be advanced in defence of the principle of the statutory limitation of adult work; and what has been done is only the thin end of the wedge. The Socialists and the Trade Unions will not allow it to stop where it is. From industry to industry will spread the attempt to apply limitation to the freedom of men in disposing of their labour to the best advantage. There has been a copious flow of thin talk about the humane side of the measure in its application to the miners, whose strength and pay make them the masters of their own situation. But there is another humane side to the question that has not been fully considered, if at all, by the authors of this legislation. Not only through the strongest part of the edifice of industrial labour has there come statutory restriction of working hours, which must inure to the forcing of

restriction on other industries, but what has already been done will increase the cost of fuel and necessaries of life to the poorest in the land. In conveying material the railway companies will have to bear some increased cost for fuel; and that increased cost must be shared by the country. In every producing industry, including the gas industry, there will be increased costs for fuel and conveyance; so that there will be a permanent cumulative result which must bear heavily upon the part of the community earning now a bare living wage. Those in comfortable circumstances hardly know what an additional shilling burden per week, in the case of the poor, means to them. Here we have a very humane side in connection with this measure. However, we are glad that the gas industry, through the Institution of Gas Engineers, the Gas Companies' Protection Association, and the Society of British Gas Industries, with (the late) Sir George Livesey, and Mr. Corbet Woodall, and Mr. H. E. Jones as the principal mouthpieces, have made vigorous protest against the iniquitous measure which has now, in its slightly relaxed form, been placed, for we cannot say good but only evil, upon the statute-book.

Land Purchase Powers.

SESSION after session, a number of the Gas Bills contain clauses to empower the acquisition of land compulsorily for manufacturing purposes; and therefore the question of parliamentary procedure in relation to land purchase is of common interest to readers. A fortnight ago, attention was directed, in an editorial article headed "Private Bills "and Blackmailing," to the distinct departure that the Board of Trade proposed should be made, and the House of Commons and now the House of Lords have endorsed, from the long-preserved procedure in respect of land purchase powers—the innovation, however, only applying to the Port of London Bill. The proposal is (the clause was a sort of after-thought, and was inserted by the Commons subsequent to the Committee stage) that the Port authority shall not be called upon to promote a Bill or Provisional Order when they require to acquire land compulsorily, but that they shall merely go to the Board of Trade, and state their desire, when the Board will appoint someone who in their wisdom they consider will prove an impartial authority to hold an inquiry, and then an order will be issued by the Board, which will have all the sanction of law after it has been on the table of the House of Commons for thirty days, and no motion has been made for an address against its enforcement. Devolution is all right up to a point. There may also be admission that the existing Committee procedure is costly and cumbersome, and that there is every reason for its cheapening and simplification. But it must still be held that neither cheapening nor simplification should be installed in our parliamentary practices by removing from the owner the safeguards and protection he now enjoys through the full inquiry he can insist upon in both Houses when land is desired by a corporation or company, and which full inquiry at the same time amply protects the public interests as represented by the promoting corporate body.

The matter was before the House of Lords last week during the consideration of the Port of London Bill; and a strange thing is that, though the Lords are the powerful representatives of landed interests, the clause was not received on either side of the House with any great amount of disfavour—there was, in fact, a preponderance of approbation. But the question as to the protection of private interests was rather kept in the background, and that of cheapening and speeding-up Private Bill Committee work was kept well in the forefront. The time may come when certain of their Lordships who approved on this occasion may have cause to regret their neglect of a personal consideration. The clause, too, had the support of the Lord Chairman of Committees (the Earl of Onslow), who is desirous of seeing how it will work. He is not always so fond of experimental legislation. The preferential aspect of the proposal in favour of the Port Authority was a second objection that was raised a fortnight ago. This objection will be annulled if the hint that Earl Onslow makes may be taken as a forecast of something that will happen in the future—that is to say, if the clause works well, that the plan will receive general application. But we do not see anything, in the speeches made by noble Lords on the subject, as to what will occur if the clause does not work smoothly, and causes oppression and dissatisfaction—as to whether or not it will be removed from the Port of London measure. But the main point is that of the protection of owners. The London and no doubt many other Gas Companies have, in times past, realized the importance of the protection afforded to owners by the present parliamentary procedure; and other owners have also felt its defensive benefit when their property has been coveted by gas authorities. Instances come to mind. The general desire outside Parliament must be, while cheapening and simplification of procedure would be welcomed, that it will not be at the expense of protection and justice.

The Sops of the Capital Raiser.

It is quite clear that the difficulties of gas and water concerns suffering the ban of a parentage that has not gained an unqualified approval, are increasing in the matter of capital raising. In the "JOURNAL" for Nov. 24, Mr. E. K. Burstal exposed in a letter, which was supplemented by some editorial comments in another part of the same issue, an ingenious plan that he had investigated for planting on the public some shares in the North-East Lincolnshire Water Company. What was then stated is worth reading in connection with the issue of a prospectus, on behalf of the Company, inviting applications (*at a low reserve*) for £4710 in ordinary shares of £10 each, and £750 in first mortgage debentures. This prospectus is a wonderful preparation both in style and matter. It is illustrated by reproductions of photographs of a couple of little pumping-stations and of the Fire Brigade hose display on the occasion of the opening of the Alford Water-Works. The printing is done in red and black ink. The sound and progressive nature of "this class" of investment is stated in big type, from which it is apparent that ordinary shares, ranking for a dividend up to 10 per cent. (if sufficient profit is ever earned), in a parliamentary water company having an important area of supply, are *likely* to improve in value. The draughtsmen of these prospectuses are inveterate sop-offerers, when trying to extract money from the public. In large type it is announced that "interest at the rate of 5 per cent. per annum on the shares now offered for sale is guaranteed for a period of three years." In rather smaller type, it is announced that "a full six months' interest will be paid upon the nominal amount of shares purchased on Dec. 24 next." We should have liked, in the interests of clearness and the removal of doubt, to see the "on Dec. 24 next" after the word "paid." In still smaller type, it is gathered that "arrangements can also be made by which payment of shares can, if desired, be made by instalments to suit the convenience of purchasers." Shares that require so much bait are things to carefully avoid. Before (if tempted) taking advantage of these seductive offerings, intending investors should note the statement at the end of the prospectus that "the authorized capital of the Company is £48,000—viz., £12,000 in debentures, £21,000 preference, and £15,000 ordinary shares, *the whole of which has been issued and paid up*, with the exception of 500 ordinary shares, entitled to a maximum dividend of 7 per cent. per annum." The last part of this statement is not very clear, in view of the fact that the 471 £10 ordinary shares now offered are said to be entitled to rank for a dividend of 10 per cent. However, for further information about this Company, see the issue of the "JOURNAL" to which reference has already been made.

Lighting Matters at Ammanford.

Even the most enthusiastic admirers of Ammanford would probably be prepared to frankly admit that the object of their admiration has during the last little while occupied rather more prominent a position in the public eye than that to which its importance as a residential or an industrial centre would seem strictly to entitle it. Possibly there were some few people who up to a short time ago, had not even heard of Ammanford, and many more were certainly unaware that the dwellers therein were pining for a supply of either gas or electricity. But, as is notorious now, certain persons conceived the idea of floating a company for the purpose of providing a gas-works there, or of providing a gas-works for the purpose of floating a company, whichever may be the more accurate way of putting it; and the result has been to plunge this hitherto peaceful spot into a turmoil. The inhabitants have enjoyed the fun of seeing the Council's men filling up a trench as fast as the Company's employees could open it out, together with the excitement of its Police Court sequel; and now they feel the pride of learning that their town has been

mentioned in the "Gazette" as the subject of Parliamentary Gas Bills. In spite of all this, however, they would appear to be still in need of light. Their experience in regard to a gas supply having been so unfortunate, attention has now been turned to electricity—a scheme for the provision of which has been placed before the Council, and in its turn agreed to in principle by them, for the lighting of the streets. Perhaps some of the councillors have still a good deal to learn about gas. It would not be astonishing if it were so; for their acquaintance so far has been more with a particular class of company promoting than with the actual supply of gas. But however this may be, anyone who reads the report of the debate at a special meeting of the Council which is given on another page of this issue will feel that certain members have room for increasing their knowledge on the subject of electricity; and if this be the case, they may in the near future have an opportunity of acquiring additional information. The one member of the Council who did at the meeting venture to raise a mild doubt as to the advantages of electricity from a monetary point of view, was promptly termed a "Rip Van Winkle" on matters electrical—a retort which was without doubt considered to possess in wit what it lacked in technical argument. In the circumstances, we may be pardoned for expressing the hope that the Council will be more fortunate with electricity than they have so far been with gas—they could not well be less.

Protecting Investors.

Last week remark was made upon some pertinent advice to investors by the President of the Board of Trade; and truly investors want advice in these days when company scandals abound on every side. The "Pall Mall Gazette" has had something to say on the matter. The third reading of the Companies Consolidation Bill having been secured, another useful codification of our laws is accomplished, and the Companies' Acts are now reduced to something like orderly arrangement. But (says our daily contemporary) a good deal remains to be done before the safety of the average investor is realized; and some strengthening of legislation is required even at the expense of its being dubbed "grandmotherly." But with regard to the company scandals around, it is doubted whether as much use is made, as might be, of the right to appeal to the Board of Trade to make inquiries, in certain circumstances, into the position of joint-stock undertakings. This refers to the inquiry provided for under the 1862 Act. But the limited use that has been made of the power then brought into being in the direction pointed to, is no doubt due to the somewhat cumbersome and expensive character of the machinery. Our contemporary, however, entertains the view that, if the subjects of inquiry were narrowed down and clearly defined, the procedure under the Act might be useful and not very costly—at any rate, there is conviction that from the Board of Trade the chief protection of the shareholder can be secured. Dividendless shareholders in gas and water concerns with an unconscionable load of capital blocking progress to the dividend state, should look into these matters and see what they can do to stop the exploits of those of whom they are the victims.

To Reform the Institution of Civil Engineers.

In June last a meeting of some members of the Institution of Civil Engineers was held to consider the need for some reform in the policy and general administration of the Institution. A Committee of seven members was appointed. They have now, through their Hon. Secretary, Mr. A. S. E. Ackermann, issued a circular-letter to all members of the Institution, calling attention to the general need of a stronger and more progressive spirit among the powers that be in Great George Street. Half-a-dozen questions are put for the purpose of ascertaining the views of members, who can record their votes in an affirmative, a negative, or a neutral column. The first question asks if the member is in favour of "a reorganization in the constitution of the governing body of the Institution;" and the suggestion is made that all classes of corporate members should be represented on the Council. The second question refers to "the framing of regulations for the guidance of corporate members in respect of professional practice and conduct, and of a scale of minimum pecuniary remuneration." The next three questions deal respectively with research work, the assisting of members and students to obtain appointments, and "a modification of the present system of examinations whereby greater prominence may be given to practical experience." The sixth and last question suggests "the promotion of the general utility of the Institution premises and of its publications;" and the Committee advocate the more frequent publication of the "Minutes," a circulating library, conversation rooms, and the opening of the Institution for longer hours. It will be interesting to see what will be the result of this bold attempt to broaden the basis of government and to vitalize the proceedings of the Institution. We confess ourselves to be in sympathy with some of the suggestions made. But equally we confess we are not sanguine as to their successful outcome, for we realize the difficulty in dispersing the lethargic inactivity of the bulk of 7000 members. May good, however, result!

Revoking Foreign Patents.

Foreign holders of British patents for inventions should note that the authorities are taking the new Patents Act very seriously, and that patents are already being revoked. A patented article or process must be manufactured in this country to an adequate extent, or, if it is not so manufactured within a given time, a satisfactory reason for this must be forthcoming. The Comptroller has evinced in a practical manner his intention of not allowing the Act to subside in effectiveness; and of not accepting as satisfactory any lackadaisical procedure on the part of patentees to get their inventions taken up in this country. Certain patentees abroad have tried to escape the penalty of revocation by showing that they have advertised and written to manufacturers with a view to negotiating for the production in this country of their inventions; but the advertisements and letters were unsuccessful. Such efforts, the Comptroller has decided, are insufficient to comply with the letter and spirit of the Act. Inventors abroad who still retain rights in inventions they value will note the determination of the authorities to make the Act an effective instrument in producing some reward to this country for the protection afforded.

The Christmas Present.

Nothing much has lately been heard of the Prevention of Corruption (Illicit Commissions) Act; but let not those who build up trade through giving commission in money or goods, or those who confer favour upon the man of commerce for money consideration or some other form of reward, think that the Act is being allowed to fall by neglect into an inoperative condition. It must have come as a shock to many to read in the daily papers last week that the Treasury authorities are taking vigorous action in enforcing the penalties prescribed by the Act; and that quite recently about forty cases have been brought under their notice, and that in respect of most of them action is to be taken in the Courts. It appears, too, that in some cases the Treasury have taken up prosecutions through being put on the track by anonymous, type-written letters. The Secret Commission and Bribery Prevention League have also engaged a detective to obtain evidence of breaches of a specific character. Christmas is at hand; and there is danger in the Christmas present between business agents. In regard to these, Mr. Rufus Isaacs, K.C., says that the safest plan for all—giver and receiver—is to bring the matter to the notice of employers before indulging in, or accepting, any generosity in this particular form.

Gas at Church Bazaars.

From notices of church bazaars that have of late appeared in certain of the South London newspapers, it is clear the South Metropolitan Gas Company make it a special part of their advertising propaganda to be represented on such occasions in all parts of their extensive area. In one account, we read that the Company "added greatly to the attractions of the bazaar recently held in connection with St. Mary's Church, Lewisham, by providing an elaborate and interesting exhibition, illustrating the various methods by which gas has improved house and shop lighting, has been applied to various domestic uses, and has become an indispensable adjunct to various forms of business." When lit up in the evening, the show not only charmed some 4000 to 5000 visitors, but greatly instructed them. The hint is a useful one. At all times we are pleased to hear, and gas managers are glad to learn of, any fresh methods adopted by fellow-managers for instructing the public in the progress of the application of gas.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 846.)

BUSINESS on the Stock Exchange last week was very quiet, and nearly up to the close the tendency was dull and heavy. Affairs on the Continent and political questions at home made things restless and uneasy; and the large numbers of new issues on offer drew away support from the good investment classes of stocks. The shrinkage in Consols continued almost daily; and their revaluation at the end of the year appears inevitable. A welcome recovery in the Railway Market late in the week was an agreeable feature. The opening was very dull on Monday, and markets were generally languid with rather irregular movements. Business was not much brisker on Tuesday, though there was some investment going on in the gilt-edged class, but Consols were weaker. Wednesday brought no accession of brightness. Railways were nervous on the Coal Mines Bill; but the Foreign Market was more hopeful of a pacific solution in Eastern Europe. Thursday was a very quiet day—suffering from the competition of attractive new issues. Business in the choicest lines was lifeless; but railways made a good point of the South Wales agreement. Friday was a better day, though Consols were down again, and Government securities in general were neglected. Railways had a fairly cheerful day on further inter-company agreements and on prospects of cheaper coal. On Saturday, the improvement became more general, and was maintained to the end; the close of the week being a happy contrast to its opening. The Money Market was consistently firm, with a good even demand for short loans; and discount rates were steady. In the Gas Market, the volume of business was certainly lighter; and movements in prices were few and rather irregular. The most noteworthy incident was on Friday, when the terms proposed by the Gaslight and Coke Company for amalgamation with the West Ham Gas Company became known. A price of 112 for West Ham ordinary was immediately made; and next day the quotation was put at 111-113. Dividend for dividend, this is equivalent to Gaslight ordinary at par. The last-mentioned issue was not quite so firm, falling half-a-point, with transactions ranging downward from 100¾ to 99¾. The secured issues were firm, the maximum marking 89½ and 90, and the debenture from 85 to 85⅛ (a rise of ½). South Metropolitan was quiet and unchanged, transactions showing a range from 119½ to 120⅜. The debenture was done at 86 and 86¼. Commercials were very quiet; the 4 per cent. marking 106¼, the 3½ per cent. 103 free, and the debenture 82. In the Suburban and Provincial group, Alliance new was done at 13, Bournemouth "B" at 16⅝ and 16$\frac{15}{16}$, Brentford new at 189¾, West Ham at 110 and 112, and ditto debenture at 107. The Continental companies were very quiet. Imperial marked from 180 to 180¾, ditto debenture 95, Union 107 and 105½ free, European fully-paid from 23¾ to 24, ditto part-paid 17½ and 17$\frac{9}{16}$, and Tuscan from 9⅝ to 9¾. Among the undertakings of the remoter world, Buenos Ayres was marked 11⅝, Oriental 140 and 140¾, Primitiva preference from 5⅛ to 5$\frac{7}{32}$, River Plate from 13¼ to 13⅜, and San Paulo 14¼.

ELECTRICITY SUPPLY MEMORANDA.

Linking-Up—Metallic Filaments and the Charge per Unit—Restrictions and Costs of Electricity—Lamp Price Reductions—Dublin City Hall Fire—Radiator and Cooker Inefficiencies—A Board's Deficits—Hypothetical Evils.

LINKING-UP is a new policy in electric supply that is gaining ground. The linking-up Bills of the London undertakings have passed through all the dangerous stages of their parliamentary career; and we shall soon hear of them being on the statute book. The West Ham Borough Council and the Charing Cross Company are, we suppose, still negotiating for intercommunication of their respective systems; and now pourparlers are proceeding between the South Metropolitan Electric Light and Power Company and the Beckenham Borough Council with the same object in view. The new London Bills have done much to carry out the policy of the Government to bring about the unification of the electricity supply of the Metropolis in regard to purchase. What has been done this session has no doubt also put an effective obstacle in the way of a fresh power and bulk scheme; and, if this should prove so, the present electricity suppliers will have something to be thankful for. From the first, it has been contended in these columns that they should have full and free opportunity to work out, without hindrance, that which Parliament had authorized them to do.

The reduction in the revenue of central stations through the use of the metallic filament lamp has brought forward in several places the question of tariff reform in connection with electricity supply; and in Beckenham (probably there are other places) it has been suggested that, if, through the adoption of these lamps, the undertaking cannot pay its way, then those consumers who employ such lamps must temporarily be subject to an increase of price per unit. There has not been agreement with the District Council over this matter, because there can be no possible justification for charging a consumer more for current on account of the fact that he employs the improvements that science offers him, while the consumer who lags behind in adopting fresh and more economical productions still continues to have his electricity at the old rate. The consumer buys current. It is for him who pays to decide the use to which it shall be put. The District Council it is seen from a report presented at a recent meeting are still harbouring the idea of the differential price; but as yet there is not the occasion for putting it into operation. But the fact that the idea lingers shows that the fear of financial injury still exists. The only admirable thing about the proposal is that the Council are averse to the undertaking being a charge on the rates. If there is any danger of this, the fairer way would be for the price to be raised all round. Of this there seems to be no doubt, that some of the Beckenham electricity consumers are glad to find a lamp that will yield some economy for them; for certain of the consumers on the "free" wiring system have already, without the consent of the Council, had transformers installed, and alterations made for enabling the use of the lamps. This interference with the Council's property is an irregularity; and the consumers in question have been duly reprimanded. There is now a proper way whereby such consumers can obtain the advantage of the high efficiency lamps; and it is by paying the Council a fixed charge of 2s. per lamp per annum to cover wiring rent, and the cost of the transformer and fixing. Of course, the consumers supply lamps and pay meter-rent. To gain economy in current entails a continual charge of 2s. per lamp per annum! The illustrations as to the restrictions and expenses of electricity supply have not ceased accumulating.

While referring to some of the effects of metallic filament lamps, it may be noticed that the lead given by the General Electric Company in reducing the price of Osram lamps has been followed by makers of other types. It looks as though the supply of the lamps now greatly exceeds the demand. If not, why has there been this entrance upon a rate-war between the makers? It is quite evident that the Osram lamp among the metallic filaments will set the pace. It is also noticeable how little is heard now in electrical circles about the immediate predecessors of the higher efficiency lamps. They seem to be going to the wall fast—even faster than the carbon filament lamps. There are, however, still many private users who do not like the first expense of the metallic filaments, nor do they like the expense of making the necessary alteration to their installations and putting in transformers, for the purpose of being able to use the lower power high efficiency lamps.

There has been great trouble at Dublin regarding the recent fire at the City Hall, in which some valuable oil paintings were destroyed and other damage inflicted. It will be remembered that, at the meeting of the Council before the fire, there was a collapse of the electric light in the Council Chamber, and the Electricity Department had the installation put in order again. The hot-water heating apparatus had been put out of use long before the fire occurred; and to electricity the catastrophe was publicly attributed. The accusation was promptly denied in the interests of the Electricity Department; and the source of the fire has not yet been traced. But one of the members of the Council—Mr. Quaid—has got himself into terrible disfavour among some of his fellow-members; though he does not seem much the worse for their attacks upon him. It appears that he has communicated something or other to the Press. What that something is, is not known to us; but there is talk of a suppressed document. There is a great deal of uneasiness over this matter, as the Electricity Department are dreadfully afraid of people shunning electricity on account of its sinister character as a fire-raiser. A resolution has been before the Council describing Mr. Quaid's action as unbecoming a member of the Council; and the mover was Alderman M'Walter. We wonder what this gentlemen meant when he said: "Things might have been discovered by Councillor Quaid which the officials did not want made public; but it was not right for him to rush into the Press." This is rather vague; and we are left wondering.

It is really agreeable to find that all electrical engineers do not decline to look fairly and squarely in the face the facts surrounding electric cooking and heating. Only recently notice was taken in the "Memoranda" of Mr. W. R. Cooper's paper on the subject read before the London Section of the Institution of Electrical Engineers; and the paper has been before the Glasgow Section for discussion. We know from experience the drawbacks of electricity as an efficient agent; and among them stands its inefficiency from the heating point of view. We have tried electric radiators—and shivered. Among the speakers was Mr. Mavor. He has used radiators, and has been disappointed. Mr. J. W. Mackenzie has found no known type of apparatus which would heat up a room to any appreciable extent. Mr. Austin stated that the most common mistake was to expect an ordinary four-lamp radiator to heat a room. He also thought there was a long way to go before reaching anything like the perfection of other commodities. After the avalanche of testimony of which the extracts are a sample, Mr. Cooper, in his reply, found it wise to agree that, if it is desired to warm the whole of the air of a room, he effect of the radiator from the financial point of view is decidedly poor. "On the other hand, if one could sit in the rays of a lamp radiator, the effect, though local, *might* be all that was desired." So users of electric radiators are limited in the choice of the position in which they sit, and must adjust themselves to circumstances.

In the same discussion, there was much said on the use of electric cooking appliances. Electric ovens, saucepans, and the like, were described by Mr. Mavor as delicate and inadequate for their purposes. While Mr. Sillery considered electricity at 1d.

per unit cheaper than gas for cooking purposes, Mr. Mackenzie gave some practical experience showing that it was not—in fact, he bluntly stated that he was surprised to hear from Mr. Sillery that electricity was cheaper than gas under certain conditions. Mr. Kerr, too, thought the idea of using electricity for every purpose was out of the question. Some experiments by Mr. Austin have led that gentleman to think that electricity at ½d. per unit is equal to gas at 2s. per 1000 cubic feet. On this question of costs, one of the instances given by Mr. Mackenzie was a tea-boiler on the Glasgow system (at 250 volts); the capacity being 60 gallons. By electricity this was brought to the boiling-point in 29 minutes; and the energy used was 37½ units. This at 1d. per unit would mean 3s. 1½d. His impression is that about 600 cubic feet of gas would do the same work in the same time. Mr. Cooper did not do much to eliminate this melancholy testimony as to inefficiency; but he thought the delicate nature of electric cooking appliances would be surmounted in time, and the heavy first cost would show a decline with adoption. Ah! there's the rub.

Among matters that have been waiting a convenient opportunity for reference are some laudatory speeches at the November meeting of the Stalybridge, Hyde, and District Joint Tramways and Electricity Board. The speeches were of the character that suggests that all is well, and that some remarkable deeds stand to the credit of the undertaking. It is recorded in a manner that should have ensured a large measure of praise from the ratepayers for the members of the Board that they produce the cheapest electricity in England; but we have not heard that the ratepayers have been making a joyful noise over the matter. It is the conventional practice to talk at large when thanks are to be rendered for services. When, however, the speeches made on this particular occasion are looked into narrowly, it is seen that the hope has existence that the concern will, in the near future, pay its way; that if the reputation of the past is kept up, the Board will soon be able to meet all the charges and have a nucleus for repairs and renewals; but that there may have to be a change of policy. These are rather muddled points in their relation one to the other. We do not know, on the one hand, why there should be a change of policy if the Board are on the high road to a wealth of success; and, on the other hand, we must dissent from the belief that favourable results will ensue if the "reputation" of the past is maintained. It is observed that the members of the Board are working "to the best of their ability to make the concern a profitable one." The "best of the ability" of the members has produced a "reputation" for making deficits. That is a fact that is not found in the lip-praise meted out to the Chairman and Deputy-Chairman of the Board and to the Chairmen of the various Committees. Stalybridge, Hyde, Mossley, and Dukinfield are the towns interested in this joint concern; and Hyde is the only one of the four served with gas by a Company—the gas undertakings in the other three towns being municipal possessions. In the past five years, the rates of the four towns have been drawn upon in aid of the Tramways and Electricity Board to the amount of £53,305 17s. 4d.; or, averaging this sum over the four towns, £13,326 9s. 4d. apiece. Taking Hyde as the example, in the last five years the rates contributed £8131 17s. 11d. to the tramways department and £5194 11s. 5d. to the electricity department. Seeing that the exercised borrowing powers amount to about £490,000, and that the sum of £47,397 has been repaid out of sinking fund account, which is about £6000 less than the draft upon the rates, there is precious little in the financial position about which to boast.

In the light of these facts, the ratepayers of Hyde must regard as a huge joke a circular that has been sent round by the Electricity Department of the Board informing them that "every ratepayer in Hyde is a shareholder in the electricity scheme," and advising them to "use electricity and reduce the rates." The foregoing figures show what a bad investment it has been for the ratepayers. In the same circular, the sorry spectacle is seen of this Board with a "reputation" and with "ability to make the concern a profitable one and an efficient realization," stooping to talking of "noxious and poisonous fumes" of gas. We should like an explanation as to what are these "noxious and poisonous fumes," and the quantity, that arise from the use of gas (say) in an ordinary modern incandescent gas-burner. If there are any "noxious and poisonous fumes" from the gas used in incandescent burners at Hyde, then forsooth the gas distributed by the municipal gas undertakings of Stalybridge, Mossley, and Dukinfield must also produce these same "noxious and poisonous fumes." There is not the difference, to the best of our knowledge, between the gas of these three towns and that of Hyde which should make the municipal gas less productive of the so-called "noxious and poisonous fumes" than that of Hyde. We must really appeal to the Board's Electrical Engineer for information on this particular gaseous phenomenon; and we think if he has the courage to come out into the open and explain this matter, that an edifying discussion for electricians may result.

However, the facts are within our knowledge that the Board's electricity undertaking is greatly indebted to the four ratepaying gas undertakings for their financial aid, and that the ratepayers have never so far been called upon by the gas undertakings for such financial support as the tramways and electricity concerns have consistently demanded. One other point from the circular addressed to the involuntary electricity-shareholder ratepayers of Hyde. It is stated that electricity is competing favourably in the other three towns even with the price of gas at 2s. 3d. net per 1000 cubic feet; and during the past year over 5000 lamps have been connected to the Joint Board's mains. "So that in Hyde where gas is sold at a very much higher figure, electricity is by far the cheaper method of lighting, heating, cooking, and driving." This is confusing composition. The Board should get someone to properly edit their circulars, in order that such nonsense should not go forth as an evidence of the character of the Board's "ability." A connection of 5000 (8-candle?) lamps in a year in four towns is nothing over which to shout. It is a ridiculously small increase; and why it should prove that electricity is by far the cheaper method, is more than we can fathom. The ratepayers of Hyde and the other towns should ask for some more commonsense proof than the grotesque submission quoted above.

OBITUARY.

THORNTON ANDREWS.

We greatly regret to record the death on Monday last week, in his 73rd year, of Mr. Thornton Andrews, the Engineer and Secretary of the Swansea Gas Company, in whose service he had been for fifty-two years. Deceased had not been in good health for some time; and the management of the Company's business has of late been in the hands of his son, Mr. George Andrews.

Mr. Thornton Andrews was born in London in the year 1835, received the first part of his education at the City of London School, and was three years and a half at the Universities of Hanover and Göttingen. Returning to England in 1854, he entered the gas engineering profession as Assistant to Mr. Hunter Jones, the Chief Engineer of the Equitable Gas Company, which was absorbed by the Gaslight and Coke Company in 1871. Two years later, he obtained the appointment of Engineer and Manager of the Swansea Gas Company. On attaining his jubilee, he was presented with an illuminated address, a silver salver, and a purse of 500 guineas, by the Directors, shareholders, officials, and workmen; the officers having previously subscribed for a life-size portrait, of which they asked his acceptance in token of their esteem. It may be in the recollection of our readers that the members of the Wales and Monmouthshire District Institution of Gas Engineers decided to meet in Swansea in Mr. Andrews' jubilee year; and they availed themselves of the occasion to present him with an illuminated address, in which they bore testimony to the untiring energy, ability, and tact displayed by him in accomplishing the great engineering works he had carried out at Swansea, and offered their congratulations on the marvellous success the Company had attained under his able management. The presentation was made by the retiring President, Mr. Thomas Canning. In acknowledging it, Mr. Andrews said he had always striven to do his best, though sometimes suffering from poor health. He added that he should not take the prominent part in the work of the Company that he had done in the past, but he hoped to remain in harness till the last. He said he should cherish the address presented to him by the members as one of the best gifts they could have offered, as it conveyed their kind wishes to him.

The professional work of Mr. Andrews was not confined to Swansea; and at one period of his life his services were frequently in request as a Consulting Engineer. He was engaged in the transfer and subsequent extension of the gas-works at Aberavon, Briton Ferry, Carmarthen, Carnarvon, Dundee, Neath, Newcastle (Staffs.), Port Talbot, and Ryde. He also acted for Smethwick, Oldbury, Tipton, and West Bromwich at the time of the transfer of the Birmingham Gas-Works to the Corporation. He was representative of a past school of able gas engineers. He joined the British Association of Gas Managers in 1864, and passed into the Gas Institute; but his connection with that body ceased rather more than twenty-five years ago. On the formation of the Wales and Monmouthshire District Institution of Gas Engineers and Managers, he enrolled his name in the list of members. He entered the Institution of Civil Engineers as an associate in 1866, and was raised to full membership in 1878. He was one of the founders of the Gas Companies' Protection Association. Locally Mr. Andrews was held in the highest respect, as testified by the fact that he was made a Justice of the Peace.

Mr. Andrews leaves a widow (a German lady), three sons, and three daughters. Mr. George Andrews, as already mentioned, is the Manager of the Swansea Gas-Works; and his brother, Mr. Frederick Andrews, is the Superintendent. The third son, Mr. Gower Andrews, is at Abergavenny.

The funeral took place on Thursday afternoon, at the Danygraig (Swansea) Cemetery. The *cortège* consisted of 24 vehicles; two being devoted to the conveyance of the large number of floral tributes. Heading the procession were fifty old employees of the Company; and following it came the Mayor (Mr. M. Tutton), the ex-Mayor (Alderman Lee), the Town Clerk (Mr. John Thomas), a number of magistrates, councillors, guardians, and leading residents of Swansea. The mourners were the three sons and three sons-in-law of the deceased. The service was conducted by the Rev. the Hon. Talbot Rice.

The recent sudden death is announced of Mr. John Tweedale, a solicitor of Dewsbury and Leeds. Among other positions held by him were those of a Director of the Scarborough, Mirfield,

East Ardsley, Boston Spa, and Heckmondwike Gas Companies. He was a Freemason, and had been Master of St. John's Lodge, Dewsbury, and Provincial Grand Registrar of West Yorkshire. He was in his 51st year.

On Monday, the 7th inst., at the Elms, Brierley Hill, the death occurred of Mr. PETER HARRIS, one of the partners in the firm of Messrs. Harris and Pearson, fire-brick makers, of Stourbridge. On the previous Saturday he was at business, and retired to rest in his usual state of health. During the night, however, he had a paralytic seizure, and never regained consciousness. Deceased, who was a bachelor and 57 years of age, was a Staffordshire county magistrate, and a generous contributor to local charitable objects; but being of a retiring disposition, he took no active part in public work. Speaking at the subsequent meeting of the Brierley Hill Urban District Council, the Chairman (Mr. William Fullwood) referred to Mr. Harris as a man of splendid business capacity and very sympathetic nature.

PERSONAL.

Mr. D. C. DEWHURST has been re-elected Chairman of the Accrington District Gas and Water Board; the vote being unanimous. A proposal that the position of Chairman should not be held by any member of the Board for more than three years in succession, was defeated at the last meeting of the Board.

Mr. R. J. H. CLARK has been appointed Assistant Engineer and Manager of the Plymouth and Stonehouse Gas Company, in place of Mr. W. P. Tervett, who was recently elected Gas Engineer and Manager to the Devonport Corporation. Mr. Clark was a pupil of Mr. P. S. Hoyte at Plymouth, and for some time past has been one of his assistants.

COMPOSITION AND COMBUSTION OF COAL.

FOR about an hour last Wednesday week, Mr. W. H. BOOTH held the attention of a large meeting of the Association of Engineers-in-Charge, at the St. Bride's Institute, while he discoursed upon the "Composition and Combustion of Coal." The subject is a complex one; and there is considerable praise for the author's style conveyed in the remark that not for one minute did the interest of members seem to flag during the whole time.

After dealing in the first place with the theory of heat, Mr. Booth went on to discuss the probable formation and the composition of coal. If samples of coal were examined, he remarked, their composition could not be regarded as so different as was their behaviour. There was a substance found in parts of the West Indies which resembled anthracite in appearance, but was plastic brittle. It was said not to contain more than 1 per cent. of hydrogen to 99 per cent. of carbon. Yet this 1 per cent. entirely changed the nature of the carbon, producing a smoky fuel and the capacity of becoming soft with but a moderate heat. Ordinary bituminous coal contained very much more hydrogen, but did not soften at the same low temperature; and when it was exposed to heat, it softened in spots, and gave off tar vapours. Nothing was really known of the chemical composition of coal. It could be ascertained easily and with close accuracy just how much hydrogen, carbon, oxygen, or sulphur a piece of coal contained; but how the atoms of these elements were joined together seemed beyond finding out. Thus, if a piece of coal was exposed to distillation in a retort, and the different things collected that were produced, there would be found tar, creosote, carbolic acid, cresylic acid, hydrogen, various light and heavy hydrocarbon gases, and so much water and ammonia. But it could not be said that these substances were present in the coal. They had simply been built-up or broken-down from the material of which the coal was really formed; and, for anything known to the contrary, a piece of bituminous coal was homogeneous throughout in its chemical composition, and only split up into many and various bodies when heated. Since, however, it could not be known what this substance was, there was no reason further to inquire into it. It might be inferred that if the coal began to split up as soon as heated, so it would continue to split up as more heat was applied —the material splitting up more and more into lighter and heavier portions so that nothing but pitch remained in the still; and after further heating, even this was resolved into coke and vapour.

As to the action of coal when burnt in a fire exposed to air, the author pointed out that there was perhaps a more complicated set of reactions in this case. There were operations both of distillation and combustion. He quoted an experiment first shown by Mr. Horace Allen, who sprinkled upon a red-hot plate of porcelain some finely-divided bituminous coal. At once vapour commenced to be given off, and a dark spot surrounded each bit of coal. The coal did not glow so long as the vapour was coming away from it; but when the vapour ceased to escape, the coal began to get hot, and the dark spots on the plate disappeared. The coal then commenced to glow—in fact, to oxidize and disappear. From this experiment, he said, much might be learnt—first, that the primary effect of heating coal was to drive off its volatile portions. Actually, of course, heat rendered the coal partly volatile, and drove this portion away. The vaporizing of this demanded heat; and the vapour rendered so much heat latent that it dulled the surface of the plate. When this chilling effect was finished by the escape of all vapour, the remaining piece of coke gradually became hotter; but it did not oxidize brightly until it had attained a high temperature. These actions taught them that coal upon a grate would be very seriously cooled if fresh coal was placed upon it, and that the volatile matter must be thrown off any piece of coal before its carbon skeleton would begin to burn. In a thick bed of coked coal on a grate, the chilling effect of fresh coal might not extend right down to the grate-surface; and the fuel next to the grate would burn with the incoming air at the same time as the gas from the green coal burnt on the surface. If the fuel-bed was thin, the carbon dioxide first produced on the grate came to the surface as dioxide, and hindered the combustion of the volatile matter. If the fuel was thick, the dioxide might be converted into monoxide in its upward passage through the fuel; and this would again hinder the combustion of the volatile matter. The final gaseous mixture above the fuel would be very complex, and usually it would be by no means very hot. Experience told them, as explained by Mr. Swinburne, that this mixed mass ought to be kept hot in a non-absorbent furnace until combustion was complete.

Ordinary coal, Mr. Booth stated, had a calorific capacity of about 14,000 B.Th.U. per pound; while the volatile matters distilled from it had a capacity of 18,000 to 24,000 B.Th.U. The extra 4000 to 10,000 B.Th.U. were borrowed from the heat of combustion of the solid fuel on the grate; and when the green gas was wasted unburnt, it was carrying with it the latent heat of distillation. Assuming 20,000 B.Th.U. as its average heat value, and taking one-third of the coal to be volatile, the green gases carried off nearly half the heat value of the coal. Though the molecular structure of coal might not be discoverable, there could be no doubt as to the results of the systems of combustion ordinarily adopted. If fired on the coking system, the gas was driven off more or less steadily and continuously, and placed less of a tax on the furnace at any one moment in respect of maximum air supply above the fuel to burn the gas than was levied when fresh coal was spread heavily over a fire at more or less wide intervals of time. Mr. Booth dealt fully with the gaseous hydrocarbons, and said that, "if the physical behaviour of hydrocarbon coals can be somewhat understood as a result of a study of the gaseous hydrocarbons, a beginning has been made in understanding how a furnace should be arranged properly to carry out the somewhat complex operation of combustion."

In conclusion, he remarked that heat was swallowed up when solids were liquefied or liquids gasified; and these were the things that happened to coal when burnt. They retarded its perfect combustion; and the engineer who could best fit practice to meet Nature's laws on proper conditions would best utilize coal as regarded economy and cleanliness. The knowledge of what happened thermo-chemically in the life history of the hydrocarbons, furnished ample explanation of the failure of ordinary methods of burning it without heat or temperature conservation.

THE PROGRESS OF "COALEXLD."

IN the "JOURNAL" for the 3rd ult., reference was made to the heating value of the new domestic smokeless fuel which Mr. James Jowett, of Bolton-le-Sands, has introduced under the above name, as demonstrated at some practical trials carried out at Morecambe, where, as may be remembered, it has for some months been produced by Mr. Blakey, the Manager of the gas-works. In previous remarks on this fuel, we have pointed out that it has special interest for our readers, inasmuch as its extended use would mean a considerable diminution in the stocks of coke in gas-works yards. This has lately been exemplified; for we learn that in some of the works in which Mr. Jowett's process has been put in operation, there are now to be seen open spaces which were formerly occupied by stacks of coke. Apart from the gratification of having a clear yard by the production and sale of "Coalexld," managers will find it a source of additional profit, if we may judge by some figures which have reached us. They refer to a small gas company who are making, on an average, 100 tons per week. In 1907, the coke sold at home and sent out of the town produced £2936. This year the same bulk of "Coalexld" is estimated to yield, after allowing for the cost of chemicals, £3370—a difference of £434. Reckoning that the whole production of "Coalexld" (5200 tons) will be sold at home in 1909 at this year's price, the extra profit compared with 1907 will be £573, or £139 more than that resulting from the divided sale this year. If these figures can be verified, as we are assured they can—sales last month fully justifying the estimate for next year—the advantage of treating coke for the production of the new fuel does not require pointing out. Moreover, while increasing his profit, a gas manager will have the satisfaction of reflecting that he is "vending a commodity which will not pollute the atmosphere." That Mr. Jowett's fuel is daily held in greater appreciation is shown by the fact that, owing to the increased demand for the chemicals required for its production, he has acquired large premises and offices at Lancaster for measuring and despatching them. Members of the Manchester District Institution of Gas Engineers who attended the recent meeting at Oldham were afforded an opportunity of witnessing the production of "Coalexld," and forming an estimate of its worth.

THE PROPOSED NEW PROFESSORSHIP.

By A Manufacturing Engineer.

The decision of the meeting held on the 10th inst. (at the Institution of Mechanical Engineers) to take steps, as a memorial to the late Sir George Livesey, to raise the necessary money to endow a new Chair in the University of Leeds to be definitely concerned with the gas industries, is a step which recognizes in perhaps the most acceptable way both the unique character of Sir George's connection with those industries and the important position they now occupy in our country. It will be the desire, no less than the duty, of all of us to give the heartiest support to those who are responsible for making the proposal a practical success. It is in this spirit that, on the threshold of its inception, some of us who, like myself, have had considerable experience in the working of present-day systems of higher technical instruction, may be permitted to offer a few remarks with a view of showing what our efforts should be bent on securing and, equally important, of avoiding.

We Must Have the Right Man

In the first place, let us recognize that success will depend primarily on the personal character and attainments of the new Professor; and it is to be hoped that he will be selected no less for his sympathy with this particular branch of industry than for academic distinctions. The importance of the former is not infrequently lost sight of in filling such appointments, to the continual disadvantage of true educational progress. In most other subjects, however, the student can always avoid an unpopular Professor by going to another college. For some time at least the chair under consideration will be the only one in the country; and an unsuitable appointment would be increasingly deplorable. The only practical safeguard is to make the appointment for a definitely limited term of years in the first instance, and its continuance to be subject to the approval of the Committee which is now making it its duty to create the Chair.

And the Right Kind of Students.

Then, again, is it too much to hope that a rational system of selecting students will be followed, so as to avoid turning out a large number of college-trained men who from the nature of things cannot afterwards fit themselves into the industrial system? That this is one of the greatest faults of the present system of technical education, cannot be doubted by any who have knowledge of college-trained men in actual industrial conditions; and it is a most surprising thing that the matter has not been thoroughly investigated ere this.

It is worth while to trace why there have been so many failures among these men, when compared with the few successes. I think I will be able to show presently that there is a logical reason.

A Seeming Paradox.

In other special subjects, we have really splendid facilities for technical education in these days; yet we are often reminded by those who conduct our Technical Colleges that the number of students seeking to profit by these facilities is totally inadequate. On the other hand, there is scarcely a month goes by without the appearance of bitter complaints in the Technical Press from University graduates and past-students on account of the great difficulty they experience in securing suitable posts in the industries. Thus, while the colleges demand many more students, it would appear that the number of those trained is in excess of the actual requirements of the case. This, on the face of it, looks paradoxical, and requires consideration.

We are accustomed to hear (from educationists who usually know very little about industry or business) that employers are not fully alive to the advantages of employing college-trained men in larger numbers, that our industrial supremacy is thereby threatened, and that if we would only do as they do in Germany, &c., &c., how much better it would be for us.

Well, I do not think I need seriously dwell on such statements. With few exceptions, our industries are carried on quite as successfully as those abroad (or more so); and whatever may be our shortcomings, I think we are more likely to know what is best for the management of our works than those who have never been connected with a works in a position of any responsibility. I may quite fairly and without offence place the great majority of our educational experts in the latter category.

The Explanation.

The truth is that our system of technical education as a whole takes no account of the diversified character of the work involved in controlling a large industrial establishment. Broadly speaking, that work divides out into four chief sections, as follows:—

(*a*) Technical experts (*b*) Works management	Productive side.
(*c*) Buying and selling (*d*) Finance	Commercial side.

Whether you are considering a large gas-works or an engineering factory, or any other big industrial concern, the same four principal elements will be found—each as important as the other; for while in some places the technical man, being the strongest character, will dominate his colleagues, so, elsewhere, will the financial man for the same reason be found in the ascendency. Now, the kind of training given at college has only (and can only have under present conditions) a direct bearing on the first of the departments named above; and that department is the smallest and most exclusive of the lot. Moreover, special and proved ability is required for success in the kind of work undertaken there, and openings are in any case very few. In the second department (works management), the necessary detail knowledge, and also experience in the control of men, can only be acquired by years of training in lesser positions in the works. Let it be remembered that no college training can supply these essentials. Similarly, in the remaining two divisions, it can hardly be said that those special characteristics which we expect to find in the officials in charge are necessarily dependent on a technical college training in the present sense of the word.

Why We Have Failures.

The startling fact now becomes apparent that the present college courses are framed so that they can only be of direct service in one of the chief managerial divisions which have been described; and in that branch the openings are comparatively few, and the standard of attainment very high. It is also implied that men engaged in that department have the necessary inherent talent for the particular kind of work undertaken by the firm which employs them. Otherwise they will after trial be rejected as unsuitable.

Having regard to these considerations, is it surprising that men should experience difficulty in finding openings after completing their college courses? And, further, is it not to be expected that many students receive a college training at the present time who, through lack of inherent character and ability, cannot possibly be expected to prove of service in positions of responsibility? The net result is a great deal of bitter disappointment both to the majority of students and those who have to employ them.

The Remedy.

The first step is to remember what the colleges can do for our young men, and also what they cannot do; and this will only be secured if the Professors are definitely brought into touch with responsible managers and employers. In other words, there ought to be regular consultations between the academic and practical elements, so that each would help the other in approaching the work in hand.

Secondly, there should be an effective system of selection in operation, which ensures that the right kind of student shall receive the instruction which is offered. This means that technical students should graduate *from the works* to college, *and not from the secondary schools* as is mostly the case at present. Men who first distinguish themselves in the works are obviously the best raw material for the college courses; and being in a sense proved men, they are not likely to find any great difficulty in securing suitable employment on the completion of their studies.

Special Lecture Courses.

Passing from the student to the actual courses of instruction, I would like to add a further suggestion. It is impossible to expect any one man even of distinguished ability—such as we hope the new Professor will be—to have a thorough acquaintance with all of the innumerable special branches of a great industry such as that in which we are interested. If the Professor in his lectures and research work concerns himself chiefly with the scientific principles which lie at the root of the matter, he will have an abundant outlet for his energies; and I wish to suggest that, further to his efforts, responsible men who are acknowledged authorities in special branches of work should be induced to deliver courses of lectures on their own subjects. Two or three such courses delivered during the session by different authorities each year, and published in the Technical Press, would command world-wide attention, and would give the new department a unique prestige.

The Advantages of a Fresh Start.

When, some ten years ago, increased attention was manifested in technical education, and new colleges and laboratories were subsequently built, there was little actual experience available here as to the operation of this particular kind of educational activity. Perhaps, under these circumstances, we were wise to copy foreign methods; but all reasons for continuing to do so have now disappeared, and we may with confidence attack the problem in its fundamental principles as it exists under our own conditions.

It should be borne in mind that technical education is on a different footing altogether from other kinds of education. The only justification for its existence as a serious system is that it should train men to do work for and in the industries which could otherwise be done with less ability or not done at all. It is not general education which all should possess; and it will consequently be judged, not by the number of students undergoing instruction, but by the character of their subsequent achievements when compared with men who have had less educational advantages. Moreover, if time and money are spent in dealing with a large proportion of unsuitable students, there is a corresponding waste of resources.

For such reasons, coupled with those given previously, I consider a system of selection on the lines indicated to be essential to success; and the closer correlation of the teaching staff with

the industries is equally so. Both are comparative innovations at the present time; but if their importance is realized now, a splendid opportunity of putting them into practice will exist with the founding of the new Professorship. In making a fresh start, there are no vested interests or inconvenient traditions to hamper progress. Let us realize the fact.

It will be thereby possible to create a new conception of the scope and possibilities of higher technical education which would be in keeping with the character of Sir George Livesey, whose memory the new Chair is to keep green, and who himself was always, above everything, a true pioneer of progress.

STREET LIGHTING IN ST. MARYLEBONE.

Proposed Substitution of Electricity for Gas—Protest by the Gaslight and Coke Company—A Check to the Electric Supply Committee.

On the *agenda* for the meeting of the St. Marylebone Borough Council held on the 3rd inst., appeared the following item:

To receive and consider report of Special Committee (Street Lighting). 25th November, 1908. Present: Mr. Alderman E. T. Fowler, in the chair; Councillors Dr. T. J. Bokenham, E. R. Debenham, C. Kempton, and A. H. D. Nonweiler.

LIGHTING OF STREETS BY ELECTRICITY.

On the 5th November, a Special Committee was appointed by the Council for the purpose of considering and reporting upon a proposal made by the Electric Supply Committee to light certain of the ordinary street-lamps within the borough by means of electricity in place of incandescent gas-lamps as now used.

It was suggested that electric light should be installed in the lamps in those streets where electric mains are now laid, the present lamp-standards and lanterns being utilized. The number of lamps affected is 1964; and it is proposed to deal with them as follows—namely, to instal in the present

1114	single burner lamps	. .	one	50-candle power tungsten lamp
827	double ,, ,,	. .	two	40-candle power tungsten lamps
23	triple ,, ,,	. .	three	40 ,, ,, ,,

It is stated that this will give an average light 2½ per cent. greater than that now shown by photometric test to be actually obtained from the system at present in vogue.

The Electric Supply Committee offer to undertake the lighting and maintenance of these lamps and columns for a sum of £8650 per annum, as against £8818, the amount paid for gas lighting. Included in this sum of £8650 is an amount sufficient to meet interest and sinking fund charges on the cost of the proposed conversion; and when such charges are reduced, there will be a considerable reduction in the cost of lighting as compared with the present system.

The Electric Supply Committee will be responsible for the carrying out of the whole of the work connected with the maintenance and renewals to the satisfaction of the Lighting Committee.

We recommend that the Council accept the offer of the Electric Supply Committee to light the lamps above referred to on the terms above mentioned, and request them to expedite the necessary work; and that the Finance Committee be requested to render all necessary assistance in submitting estimates, so that the conversion may be carried out as speedily as possible.

It will be observed at once, upon reading this report, that the Committee appointed to consider a matter of such importance and magnitude had arrived at its conclusions within less than three weeks of its appointment; that the Committee refer in their report to a "photometric test" of the existing gas-lamps, without giving any particulars whatever as to how many lamps were tested, when they were tested, how they were tested, by whom, or in whose presence, and without giving a single figure relating to those tests; that no reference is made to any negotiations having been opened with the present suppliers of illuminant to the 1964 lamps in question—*i.e.*, the Gaslight and Coke Company—nor of any offer of revised terms having been invited from them; that the Committee give no figures as to how the proposed charge of £8650 per annum is made up—no price to be paid for current; no estimate of the cost of renewals; no estimate of the cost of conversion; no period over which that cost is to be spread or the rate of interest calculated; in short, that the report is bald, unsupported by evidence, and inadequate to the last degree.

There is, however, an explanation, as simple as it is astounding, of the baldness, the unconsidered nature and inadequacy of this report—an explanation that could not, however, immediately strike the uninformed eye. The names of five members composing the Committee in question are, it will be remembered, set out at the head of their report. They were purposely so mentioned. The first is that of Alderman E. T. Fowler. He is a member of the Electric Supply Committee. The second is that of Councillor Dr. T. J. Bokenham. He is a member of the Electric Supply Committee. The third is that of Councillor E. R. Debenham. He is Chairman of the Electric Supply Committee. This Committee were appointed "for the purpose of considering and reporting upon a proposal made by the Electric Supply Committee"!

The meagreness of the report, the fact that it had not been circulated in time for the important proposal it contained to be properly considered, and the "interested" source of its origin, did not, however, prevent the Council, on the 3rd inst., from adopting the Committee's recommendation by "a large majority." Alderman Fowler, in moving the adoption of the report, said the Council would get "a much better light"—that being his way of referring to the (hypothetical) 2½ per cent. increase in illuminating power which was all that the report itself claimed for the proposed electric lamps. What extraordinary ignorance of street lighting matters is displayed by anyone who can speak at all of a difference of 2½ per cent. in candle power, based upon street photometry results—to say nothing of speaking of such a difference as providing "a much better light"—when everyone who knows anything whatever about photometry knows that two readings of the same light by two operators, or even by the same operator, frequently differ by more than this percentage; while a difference in the angle at which the readings were taken in the street might have made 25 per cent. difference in the results. As to what warrant the Committee had for speaking of any improvement whatever being effected by the proposed change will be considered presently.

Councillor Brinsley-Harper is reported as having said, when seconding the resolution, that, even if the electric light was more expensive, they should support it because they would be a big customer to their own department; and the same line was taken by other councillors, and was, indeed, the principal factor governing the decision of the Council. It is the old, old fallacy that has cost, and is destined to cost, the ratepayer who has the misfortune to own an electrical undertaking a pretty penny before it is done with. Take a sovereign out of the ratepayer's pocket as "lighting rate," and (if you are lucky) put a shilling into his pocket as profit on current sold for public lighting; and then cry to him: "Look what a big business the Electric Supply Committee are doing! Look at the shilling profit they have made on public lighting." But be sure and not remind him of the extra pound paid as lighting rate. That would be silly; for it might make him annoyed with you.

The Special (three-fifths Electric Supply) Committee, however, did not get their proposal through without certain opposition. Lieut.-Col. Maude moved, and Councillor Crichton seconded, an amendment proposing that any change made in the lighting of the streets should be tried first in one street, to which Councillor Debenham is reported to have replied—we use the word "reported" advisedly, for it is difficult to believe that he could have really said—that "it was impossible to experiment on a small scale." If this actually was said, can it have had its origin in the fact that the Hampstead Borough Council have experimented with metallic filament lamps for street lighting on a small scale, and decided not to extend the experiment?

Alderman Fowler replied to the discussion. He is the gentleman who, it will be remembered, when Chairman of the Lighting Committee, first recommended gas in preference to electricity for lighting Oxford Street, but "found salvation" and recommended electricity, when the Electric Supply Committee had been allowed to amend their tender, after seeing that of the Gaslight and Coke Company. After this authority had told the Council that, under the proposed scheme, they would not only get an improved light (no mention here of 2½ per cent.) and at a cheaper rate, but at the end of ten years they would save about £700 a year—omitting to add, however, that that was if gas was then not cheaper, and electric light was then not dearer—the Council, as already stated, voted the recommendation by a large majority, and thought, possibly, that that ended the matter. If, however, the Electric Supply—we should say, the Special—Committee thought that, by carefully refraining from communicating with the Gaslight and Coke Company, by springing their report on the Council at such short notice, and by recommending that a proposal for improving the lighting of the streets by no less than 2½ per cent. should be regarded as urgent, they could leave the Gaslight and Coke Company (who only pay £7000 a year in rates to the borough) out of their reckoning altogether, they made not their first, nor probably their last, miscalculation.

Directly the recommendation of the Committee and its adoption by the Council were made known at Horseferry Road—not by the Council, but by newspaper report—a letter was sent by the General Manager, Mr. D. Milne Watson, to the Town Clerk, for the purpose of entering "an earnest protest against the adoption of a proposal to take away a very large volume of business from a Company that (paying rates to the amount of over £7000 a year) is one of the largest, if not the largest, of the tradesmen ratepayers in the borough, without that Company being given the slightest opportunity of submitting any alternative proposals for the consideration of the Council, and upon the recommendation of a Committee having upon it, and constituting a majority of its members, the Chairman and two other members of the Electric Supply Committee." Mr. Milne Watson then proceeded to say: "For the Council to enter into a contract with any undertaking, whether public or private, for the payment of £8650 per annum for street lighting, without inviting a competitive tender from the existing contractor for the supply of illuminant in the streets under consideration (the undertaking in question having, be it noted, information as to the present cost of the gas lighting, enabling them to underquote by a narrow margin) is, I venture to submit, for them to grant an undue preference to that undertaking which is unfair to the present contractor—*i.e.*, this Company—to a degree that, I am certain, cannot have been realized by the Council when the matter was before them." Then followed these observations upon the proposals of the Electric Supply Committee:—

At the present time, the work of lighting and maintaining the gas-lamps in the borough is entrusted to a third party, not to this Com-

pany; and, without casting the slightest reflection upon the contractors in question, I may observe that an outside firm necessarily does the work of maintaining public gas-lamps for a monetary profit, whereas a gas company is content to put the full value of all the money received for maintenance into the work of keeping the lamps in perfect order—looking for its profit in the credit accruing therefrom to gas lighting.

On that point it is only necessary for me to add that, if the average light derived from the gas-lamps in the borough is accurately described in the *agenda* (namely, as being less than 50-candle power per one-burner lamp, less than 80-candle power per two-burner lamp, and less than 120-candle power per three-burner lamp), then those lamps have been maintained at not more than 70 per cent. of what their average lighting power might, and should, have been—namely, at least 70-candle power per burner.

In view, however, of the uncertainty attending street photometry, and of the fact that the results obtained thereby cannot scientifically be compared with those obtained in a properly prepared test-room, it is most probable that the test referred to by the Special Committee did something less than justice to the maintenance contractor, and a great deal less than justice to gas lighting.

The incandescent gas-burners in Marylebone, properly maintained, will give an average lighting power of not less than 70-candle power—the maximum being over 90-candle power per burner; and it is proposed to substitute for them electric lamps of 40 and 50 nominal candle power, to secure improved lighting! The 1964 lamps with gas could be depended upon, if maintained by this Company, to give an average aggregate light of 190,000-candle power—allowing a deduction for the partial obstruction of one burner by another in the double and triple burner lamps—as against the claimed aggregate of under 125,000-candle power proposed to be given by the electric lamps. The immediate result of the proposed change would therefore undoubtedly be an outcry from the ratepayers for more light—which would mean more money for electricity, or a reversion to gas lighting.

Passing from destructive criticism to constructive proposals, the Company announced their willingness to contract for five years for the lighting of the whole of the gas-lamps (over 3500) at present in use in the borough and their maintenance in the highest state of lighting efficiency, on terms (set out in detail) which would reduce the annual cost of the service by over £860. It was pointed out that the 1964 lamps under consideration for conversion to electric lighting would, at the prices now quoted by the Company, cost £8301 per annum, as compared with £8818 at present, and with £8650 per annum, the price quoted by the Electric Supply Committee; it being added, however, that if the 1964 lamps were converted to electric lighting the prices quoted would not apply to the remainder. The saving of £168 per annum shown by the proposal of the Electric Supply Committee had, therefore, to be compared with the saving of £860 per annum that would be effected by accepting the Company's offer.

Finally, the fact was emphasized that the illuminating power which the gas-lamps would give, if maintained by the Company, would be 50 per cent. higher—not 2½ per cent. lower—than the candle power proposed to be supplied by the electric lamps specified. In view of the great urgency and the importance of the matter, both to the Company and to their fellow ratepayers, copies of this letter were forwarded to each member of the Council on the 9th inst.

Although the Special Committee were, it will be remembered, able so expeditiously to consider the proposals of the Electric Supply Committee that—after, we must suppose, the most careful, exhaustive, and independent inquiry into the merits of those proposals, and into the general subject of gas *v.* electricity for street lighting, down to such a fine point as a difference of 2½ per cent. in comparative illuminating power—they were in a position to report on the subject twenty days after their appointment by the Council, the week that elapsed between the receipt of the proposals of the Gaslight and Coke Company and the next meeting of the Council did not afford sufficient time in which to get together and report to the Council that an offer had been received from that Company which deserved consideration, and to recommend that, pending a reconsideration of the whole matter in the light of that offer, it was desirable not to proceed further with the proposed conversion scheme. That, one would have thought, would have been the natural, if not the only proper, course to pursue. Yet when the *agenda* for the Council meeting on the 17th inst. was published, no mention of the Gaslight and Coke Company's letter was to be found; the only reference to the electric lighting scheme (apart from a formal report by the Finance Committee) being the following report from the Electric Committee:—

> We have instructed the Resident Engineer to make arrangements for the execution of the necessary work in connection with the laying of the service main connections to the various lamps in the streets where electric light is to be installed. We are communicating with the Distress Committee, with the view to the engaging of suitable men from the unemployed in the borough. The cost of the labour is estimated at £1964; and the material will cost a similar amount. We have requested the Finance Committee to submit a supplemental estimate in connection with this expenditure. We are of opinion that application should be made to the London County Council at once for sanction to, and advance of, a loan of £10,000, and that the County Council be informed that, on tenders being received for the lanterns, switches, lamps, &c., only such lesser amount as is then found to be required will be taken up.
>
> We recommend that the Finance Committee be requested to make application to the London County Council for sanction to, and advance of, a loan of £10,000, subject to the condition above mentioned.

Thanks to the foresight of the Gaslight and Coke Company in circulating copies of their protest and alternative offer to all the members of the Council, the foregoing resolution found everyone on the alert, and provided the necessary ground for a preliminary skirmish on the general question, in which the Electric Supply Committee suffered their first check, after a long discussion. Councillor Debenham—member of the Special Committee and Chairman of the Electric Supply Committee—in moving the adoption of the foregoing recommendation, referred to the Gaslight and Coke Company's offer; and stated that "he had *now* got exact figures as to the cost of lighting by electricity; and he could assure the Council that a very considerable saving would be effected." From the word we have italicized, and from the fact that Mr. Debenham subsequently stated that, although an application for a loan of £10,000 was recommended, "it might be only £7000 that would be required, it is fairly evident, first, that the annual charge of £8650 for the lighting of the 1964 lamps by electricity was fixed, not on any basis of the cost of current and maintenance and of capital expenditure, but simply as being slightly less than the known cost of gas lighting; and, secondly, that no proper estimates had, or have, been obtained of the cost of the work of conversion. Councillor Debenham further stated that the Electric Supply Committee had more plant than they required, and consequently they could supply current at a very moderate price; the only cost being that of coal, "about ½d. per unit." This is quite in accord with all previous history in municipal electric supply. The undertaking has a surplus of plant, it is argued; then let it have some street lighting, which will only cost the value of the coal used. This is done; and then the next thing is a recommendation to borrow more money to buy more plant, because there is not a safe working margin. Down goes some more plant, and then more street lighting is asked for to keep it employed. And so the "vicious circle" is completed, and then again commenced—the ratepayer paying all the time.

The cost of producing current in St. Marylebone for the year ended March, 1907, was 1·45d. per unit, without any capital charges whatever; and inasmuch as the public lighting load *must* coincide with the peak of the load, and must therefore reduce the margin of plant available, it is obviously financially unsound to exclude capital and running charges when calculating the cost of the current used. Putting all these charges on to, and keeping up the price to, the private consumer, is not the way to advance the real prosperity of an undertaking.

Councillor Edward White, a member also of the London County Council—following Lieut.-Col. Maude in strenuous opposition to the Electric Supply Committee—stated that the London County Council would certainly not act on a recommendation like that on the *agenda*, and demand full details of the proposed expenditure. The London County Council would say that the finance of the Marylebone Borough Council was not good finance; and how was he (Mr. White) to set things right if he had no information to lay before the County Council, which body had decided that gas was better and cheaper than electricity for lighting the streets. The London County Council was in an economical mood at present, and would keep the borough within reasonable limits. Islington had had electric light and had had to go back to gas. Alderman Dennis declared that it was a monstrous thing to ignore such a communication as had been received from the Gaslight and Coke Company; deprecated municipal trading of the kind proposed; and advised the Council to stay their hand in the matter. He moved that the recommendation be referred back, and was seconded therein by Councillor John Lewis.

The time-limit of debate having been reached, a division was taken as to whether the debate should be continued or adjourned for a month; the advocates of electricity being in favour of continuing the discussion with a view to getting their recommendation approved. On a division, however, the adjournment was carried by 19 to 17; and the first skirmish in this fight, which is not merely over gas *v.* electricity for street lighting in Marylebone, but over the far greater question of municipal trading tactics against sound business methods and finance, went in favour of the latter. Presumably, the whole question will now be shelved until it has been fully reconsidered by the Council, in the light of the Gaslight and Coke Company's letter; and the dwellers in St. Marylebone will have to wait a while for the promised improvement of 2½ per cent. in the lighting of their streets.

Steam v. Gas Engines.

On the 14th inst., at the Bradford Technical College, Professor W. H. Watkinson, of Liverpool University, gave a lecture on "The Relative Merits and Prospects of Steam and Gas Engines." In the last quarter of the Nineteenth Century, he said, internal combustion engines with gaseous or liquid fuel became most successful up to about 100-horse power. Exceedingly rapid progress in the development of gas-engines had been made during the last few years. Some makers were now in a position to build gas-engines of 5000-horse power. The development of the steam-engine was principally due to British engineers; but that of the gas-engine to Continental engineers. The steam-engine was almost as perfect a machine as it could be; and in the turbine, perfection was even more nearly attained. But thermo-dynamically, it was little better than the reciprocating engine. On the other hand, as a machine, the gas-engine was imperfect; but it might be improved by separate feed and compression pumps. Professor Watkinson said he had assisted at the trial of the first British gunboat fitted with gaseous fuel. It had been a valuable experience. The struggle between steam and gas was going on daily; and what was best to-day might not be best to-morrow.

ROUND THE WORLD—AND SOME GAS-WORKS.

By Maurice Graham.

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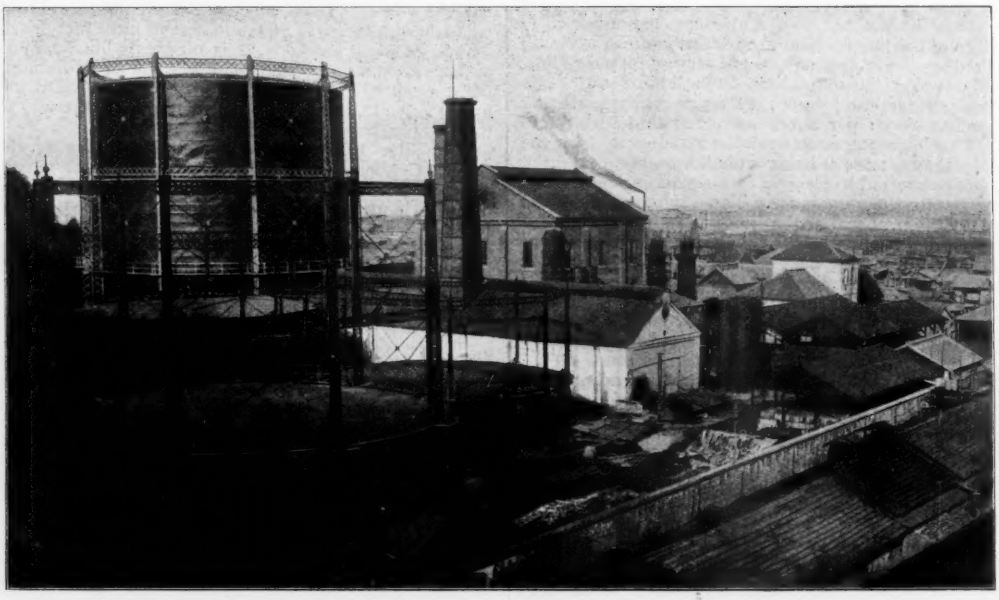
XVIII.—JAPAN: YOKOHAMA.

Kamakura, a delightful seaside watering place already mentioned, was once the famous capital of Japan, and had a collective population of over a million inhabitants, scattered about in small huts, tea houses, and chalets. There remain records of its prosperity and its ruined temples in its Diabutsu, which is considered the best work of art in Japan. From Kamakura to Yokohama the train was hot, stuffy, and crowded with a mixture of Japanese and Europeans. The first-class carriages are built to suit the stature of the Japanese; and the proportions are, therefore, wrong when the Western races try to settle down and make themselves comfortable. Everything appears too cramped and small. The roof is low, the seats low, the windows small; the ventilation is hardly sufficient for a train load of Europeans all perspiring and fanning themselves and grumbling about the heat. The Japanese occupy more room when in their national costume than they do when they wear European clothes, and loll or squat on the seat as is their custom. However, after being broiled and baked in the train, Yokohama, the largest seaport town in Japan, with 360,000 inhabitants, was reached. The heat was worse than anything previously experienced in Hong Kong or Shanghai; and as it took the form of a damp, stuffy heat, one lived in a shade temperature of 95° Fahr., and in a stream of perspiration and wringing wet clothes. If consolation is sought for in cooling drinks, then prickly heat starts; and the agony of a sensation like sitting on pins has to be put up with.

Not to be baffled by any of these Far Eastern trifles, the writer made his way to the Municipal Gas-Works to keep his appointment with Mr. S. Sakai, the Chief Engineer and Manager; and after the customary procedure of introduction, the more practical part of the interview commenced. Mr. Sakai graduated at the Tokyo Imperial University in 1900, and afterwards made a special study of the distillation of coal and coal tars, and general chemistry. He then accepted a position as Manufacturing Engineer to the Electrolyzing Alkali Works, at Kiushu, which he held for a period of two years. In 1904, he entered the service of the Yokohama Corporation, and the following year was raised to his present position of Chief Engineer. The writer has in his possession much interesting and useful information of the past history of the Yokohama Gas-Works, with the roll of the many engineers who have held appointments, but will only mention what may be of interest to the reader at the present time.

The Hanasaki-cho Gas-Works, Yokohama.

The original gas-works at Yokohama were designed by the late M. Pellegrain, a French Civil Engineer, in 1870. Some two years later, coal gas was first made and consumed in Japan. In 1875,



Photograph No. 156.—General View of the Old Gas-Works, Yokohama.

the works changed hands and passed into the possession of the Municipality. A general view of the Hanasaki-cho, or old Gas-Works is given in Photograph No. 156. The approach to these works is alongside the canal or River Sakuraki, which is used by the coal barges or lighters or similar craft. Passing over the waterway are the gas-mains, which convey the gas to the European settlement. The cost of freight in barges from steamer to the coast—about a mile—is yen 1·70 to 2, or 3s. 6d. to 4s. per ton; while landing charges, not including duty, are yen 0·80 to 1, or equal to 1s. 8d. to 2s. per ton.

The coals used are Shin-Ubari, Ubari, and Shiogashira, of which the analyses are as follows:—

	Shin-Ubari.	Ubari.	Shiogashira.
Moisture	2·12	1·500	2 020
Volatile matter	41·94	31 170	36·610
Coke	47 70	56·110	48·930
Ash	8·24	11·220	12·100
Total sulphur	1·41	1·045	1·662
Sulphur in ash	0·73	0·574	0 477
Specific gravity	1·26	1·260	1·258
Calorific power	7620	8865	7370

The two former are good caking coals, and produce good coke; while the last is only moderate. The coal is like ordinary dusty, powdered slack in appearance, and packs very closely in the retort; consequently, the same-sized charges as in English gas-works cannot be obtained. To see a piece as large as a man's hand would certainly be surprising. All the coal is unloaded in baskets, weighed at the entrance to the gas-works' yard, as illustrated in Photograph No. 157, and then dumped into the coal-stores. The average cost of labour per ton of coal from barge to stores is sen 14, equal to 3½d. The stores are built of wood, and are divided into compartments holding, at varying heights marked on the wall, specified quantities; so that there are means of easily checking stock.

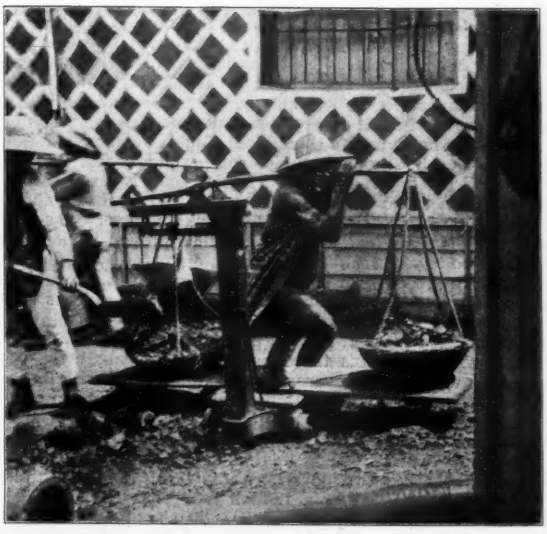
At this point, attention may be called, generally, to the advisability of designing coal-stores, so that their storage capacity is divided into units which can be easily and readily checked at any moment. No two men measuring the ordinary irregular coal pile or stack in a yard will calculate exactly the same amount. The writer is aware of gas-works where the adjustment of coal stocks on paper is effected by the quantity of gas made; and quantities of coal are debited and credited in this way. This may be all right until a time comes when, by some sudden inspiration, the works are overhauled and reported upon in a different manner from the usual year to year formula; and the shareholders and auditors then find themselves in a different position to that shown on the balance-sheet. The Japanese do not trust to chance or luck, but work on authenticated facts. When they say a ton, it must be weighed and verified; and when they purchase anything they handle the goods before they pay for them—hence the non-success of the slot-meter. It is no uncommon thing to see advertised in the Japanese papers audited statements checked and signed by six auditors.

There are two retort-houses—the horizontal or old house, and the new inclined-retort house. The former is a brick building with ordinary iron roof, and contains two benches of four beds each, with seven retorts per bed, singles, 8 ft. 6 in. long by 22 in. by 13 in., with luted lids and fired by direct fires. This house is destined to be pulled down directly the new gas-works which are in course of construction are built. At present the coal charges

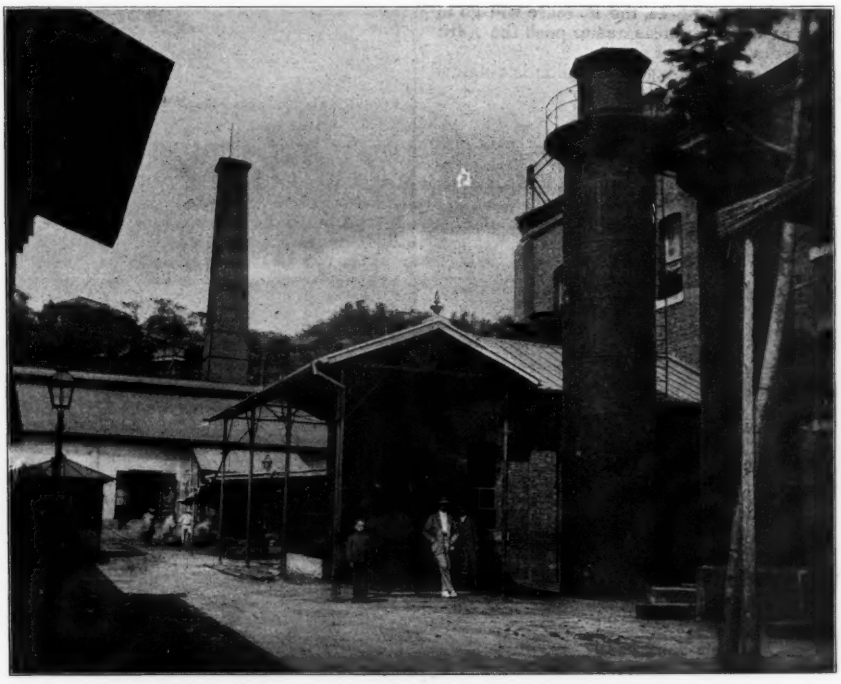
in these retorts average 150 lbs. every six hours, owing to so much heat being required even to burn off this small charge, although 230 lbs. of Ubari coal is the maximum charge for this size of retort.

The stokers receive sen 45 (10½d.) per twelve-hour shift; and the average cost of carbonizing per ton in the horizontal retorts is sen 6·9 (1¾d.). The maximum cost per ton is sen 10 (2½d.), and the minimum sen 5·2 or 1¼d. The actual amount of wages paid between these amounts is regulated according to the weather being hot or cold. Mr. Sakai informed the writer that he had no trouble at all from strikes, as he never dismissed any man unless his case had been thoroughly gone into, and he had been proved a failure from some cause or other. If the men worked honestly and steadily, their wages were increased by a bonus. So that Mr. Sakai is in a happy position many European gas managers would like to be in.

The new inclined-retort house was built in 1900, and is a well-designed and substantial building, built on the English pattern. It contains three beds of seven tapered inclined retorts per bed, 20 feet long, 21 in. by 16 in. at the top, and 23 in. by 16 in. at the bottom, set at an angle of 32 degrees. The furnaces and settings are on the "West" (Manchester) regenerative principle; and the whole of the ironwork, including mouthpieces, fittings, hydraulic mains, stages, and buckstays, &c., with the breaker, elevator, coal bunker, and "Shoubridge" charger, were supplied by that firm, and have given the utmost satisfaction. The writer was certainly very pleased with what he saw, which comprised the charging, drawing, and furnace feeding operations. Again, owing to the quality of the coal, the charges are not as heavy as in English practice, nor is the fuel account so low; but that was easily accounted for by the writer after he had seen the method of working. The duration of the charge is six hours, and the average weight of charge is 500 lbs. The stokers receive the same rate of wages as before mentioned—namely, sen 45 (10½d.) per twelve hours. The number of men employed on this inclined bench is two chargers, three drawers, and two furnace men for the 24 hours; and the total amount of coal carbonized by them in the time in the winter is 25 tons. The wages per ton of coal carbonized are: Average wages, sen 4; maximum, sen 4·5; minimum, sen 3·2 (sen 4 equal 1d.). It must here be mentioned that the furnaces in the first instance were built by Japanese bricklayers to designs supplied by Messrs. West; and the whole of the work was erected to erection drawings. The furnaces and settings were rebuilt in 1904.



Photograph No. 157.—Weighing Coal in the Gas-Works Yard.



Photograph No. 158.—Scrubbing and Washing Apparatus.

The coke is drawn below the stage into barrows, quenched from buckets and taken to the yard. All the coke produced in the works is sold to the Yokohama Fuel Company, at the price of yen 10·50, or 20s., per ton.

A Water-Jacketed Producer Door.

Mr. Sakai has added to the producer charging mouths his improved cast-iron producer charging door, which is hollow and has water circulating through it to keep it cool. The writer was greatly interested in this arrangement, and on inspecting it found that the three charging frames and doors are fed from one 2-inch diameter water-supply pipe running below the stage floor and connected to each frame by a 2-inch water inlet. There is also a 2-inch water exhaust outlet at the top of each frame connected to another 2-inch exhaust pipe which runs into the same cistern from which the supply is taken. Mr. Sakai has used this system for two years, and has never had a broken frame or door, nor any breakdown. He also utilizes this source of heat for the purpose of heating water for the stokers' baths. Unfortunately, the writer is unable to publish the drawing which was given him of this arrangement. Mr. Sakai also uses the separate door over the clinkering doors for inserting false clinkering bars. This was always found by the writer to be a great convenience in cleaning out producers.

The following are the fuel results in both retort-houses for the year ending March 31, 1908:—

Total coal carbonized	8561 tons.	
Coal carbonized in horizontal retorts	2767 ,,	
,, ,, ,, inclined ,,	5794 ,,	
Total coke produced	5565 ,,	
Coke produced from horizontal retorts	1799 ,,	
,, ,, ,, inclined ,,	3766 ,,	
Total coke used in furnaces	2162 ,,	
Coke used for horizontal retorts	974 ,,	or 35·2 per cent. of the coal carbonized in horizontal retorts.
,, ,, ,, inclined ,,	1188 ,,	or 20·5 per cent. of the coal carbonized in inclined retorts.

Passing on from the retort-house. There are four annular condensers, 3 ft. 6 in. outside diameter, 2 ft. 6 in. inside diameter,

and 23 ft. 6 in. high, and two others, 5 feet outside and 4 feet inside diameter by 27 feet high, all of which are provided with a water-spray at the top. No cover is over them; but if it were the writer considers it would be of great benefit in this climate. In the inner condenser rings, bamboo bundles are packed and a water shower turned on in the summer months.

The two exhausters are three-bladed ones, by Messrs. Laidlaw and Sons, each of 15,000 cubic feet per hour, and driven by separate Crossley gas-engines. Then comes a Livesey washer of half-a-million cubic feet per day capacity, seen in Photograph No. 158. This apparatus has been found in every gas-works, large and small, visited, and has certainly proved itself a great boon. Two tower scrubbers, 6 ft. 3 in. diameter by 31 feet high, and one "Standard" washer-scrubber, also for 500,000 cubic feet of gas, complete the scrubbing plant. All of this plant is shown in Photograph No. 158.

The purifying shed (at present partly used as a store, owing to want of room) contains three boxes, 10 feet square by 5 feet deep, with water-luted covers. One box is worked with lime and the other two with oxide. At present, all purifying material is renewed daily, which shows a rather congested state of affairs. It will be remedied directly the new works start.

There are two cylindrical meters, each to pass 10,000 cubic feet per hour, and two governors, of which one is a 10-inch single-cone, and the other a 14-inch differential balance water-loaded governor, both by Messrs. Braddock's, of Oldham.

The gasholders are four in number, all lattice-framed. Two are single lifts of 30,000 and 50,000 cubic feet respectively; the other two having two lifts of 90,000 and 300,000 cubic feet respectively. These gasholders are seen in the general view of the works (Photograph No. 156); but the largest holder and tank are better illustrated by Photograph No. 159, the capacity indicator also being clearly seen. The total gasholder capacity is 470,000 cubic feet, or about equal to the present maximum daily make of gas, which is 480,000 cubic feet. The works' annual output is 98,750,000 cubic feet, with a present 12·8 per cent. increase. It is anticipated, however, that directly Mr. Sakai is able to supply gas from the new works, the increase will go up by leaps and bounds, as he is taking measures to push the introduction and sale of gas by every known means.

There is no bye-products plant; but 5d. per gallon is obtained for the tar, or 4d. if over 4000 gallons are taken.

Some Statistics.

The following are a few statistics, among many others, obtained by the writer.

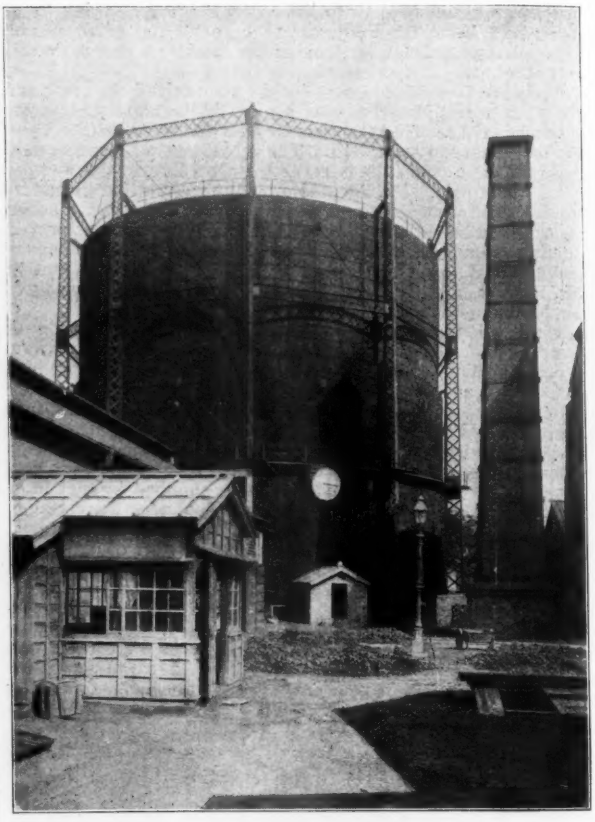
Gas Manufacture.—The manufacturing statement for the year ending March 31, 1908, shows that 8561 tons of coal were carbonized, from which about 98,750,000 cubic feet of gas were made, or about 11 530 cubic feet per ton. Of the coal used, 56 per cent. was Ubari dust, 23 per cent. Shin-Ubari, and 21 per cent. Shiogashira. The coke produced was 65 per cent. of the coal carbonized. The gross cost of manufacture per 1000 cubic feet of gas was yen 1·1229; while the income per 1000 cubic feet was yen 0·6783—leaving yen 0·4446, or 10d., as the net cost of gas per 1000 cubic feet. The net profit on the gas undertaking for the year was yen 107,890 (or £10,789), which is sufficient to pay a dividend of 18 per cent. on the capital.

Wages.—Besides the clerical staff, which numbers 32, there are 107 workmen employed on the works and outside. A list of the actual wages paid to skilled workmen and labourers at this date [August] may be of some use for the purposes of reference or comparison:—

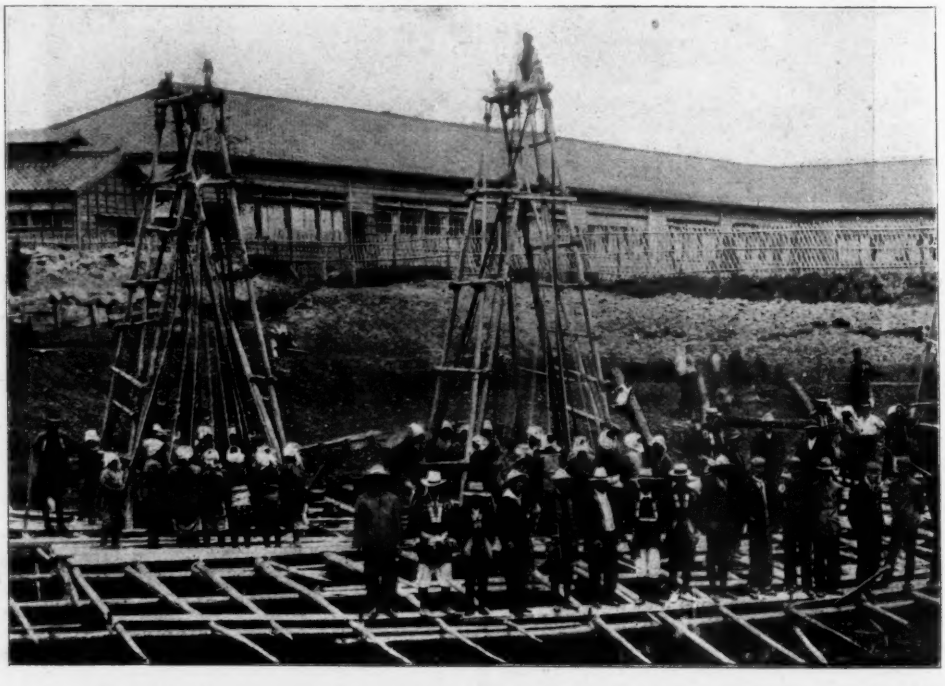
Retort-setters, joiners, platers, and riveters receive	yen	1·20	per day
Mechanics and carpenters	,,	1·00	,,
Bricklayers	,,	0·95	,,
Labourers	,,	0·70	,,
Gas-fitters	,,	0·65	,,
Coolies	,,	0·50	,,

The bricklayer is at last put in the proper order as regards the true value of the work done. The day varies from 8½ to 10 hours. [One yen = 2s.]

Main Laying.—The cost of main-laying, including cast-iron pipes, excavation, and filling in, varies from yen 0·75 per foot run for 3-inch diameter pipe, to yen 6·50 for 18 inches diameter.



Photograph No. 159.—Gasholder and Tank with Gas Storage Indicator.



Photograph No. 160.—Pile Driving, by Japanese Women, for the Gasholder Tank Foundation.

Price of Gas.—The Municipality stipulates that gas shall be supplied through meters; the price being at the following rates:—

Up to 20,000 cubic feet per month . . .	at yen 2·0	per 1000 cubic feet
From 20,000 to 50,000 cubic feet per month	,, 1·85	,, ,,
,, 50,000 to 100,000 ,, ,,	,, 1·80	,, ,,
Above 100,000 cubic feet ,,	,, 1·60	,, ,,

Electricity.—The price of electric current as charged by the Yokohama Consolidated Electric Lighting Company—

One 16-candle power lamp per full night at yen 1·70 (or 3s. 5d.)	per month	
,, 10 ,, ,, ,, ,,	1·20 (or 2s. 5d.)	,,
,, 5 ,, ,, ,, ,,	0·75 (or 1s. 6d.)	,,

,, kilowatt-hour at yen 0·28d. (or 7d.); and for hire of lamp per month, 2½d.

Meters.—The meter-rents vary from yen 0·12 per month for a 2-light meter to yen 5 per month for a 400-light meter. The charges for testing consumers' own meters run from yen 1 for a 2-light meter to yen 15 for a 400-light meter.

Inspection.—For inspecting gas-engines the charge is yen 1 per nominal horse-power; and for inspecting a new burner fixed by the consumer, yen 1·50, or if only re-arranged, yen 0·30 is charged. All gas-fitting and plumbing work done by outside fitters to the order of the gas consumer must be tested by the Gas Department and a certificate granted before the same can be used.

The cost of hiring any class of gas-burner for temporary lighting is 3·100ths of its actual value per hiring day.

Meter rents and all charges for gas supplied during the previous month must be paid on the 15th of each month.

Apparatus.—On March 31, 1908, 21,353 burners were in use, 633 gas-cookers, 463 gas-lamps, 219 gas-stoves, 84 water-heaters, 77 rice boilers, 60 gas-engines, and 25 illumination designs.

Mains.—The length of gas-mains is 61 miles; all mains below 6 inches diameter being laid 1 ft. 6 in. deep, and above 6 inches, 2 feet deep. The ordinary Japanese road is very soft, and does not stand any heavy traffic. In fact, when any heavy machinery or boilers are moved, provision has to be made to lay planks and wooden battens down to prevent damage to the road. This was observed by the writer on several occasions. There is being laid one 6-inch high-pressure main, 566 yards long, to be worked at 30 inches water pressure, which connects the new works at Hiranuma with No. 4 gasholder at the old works.

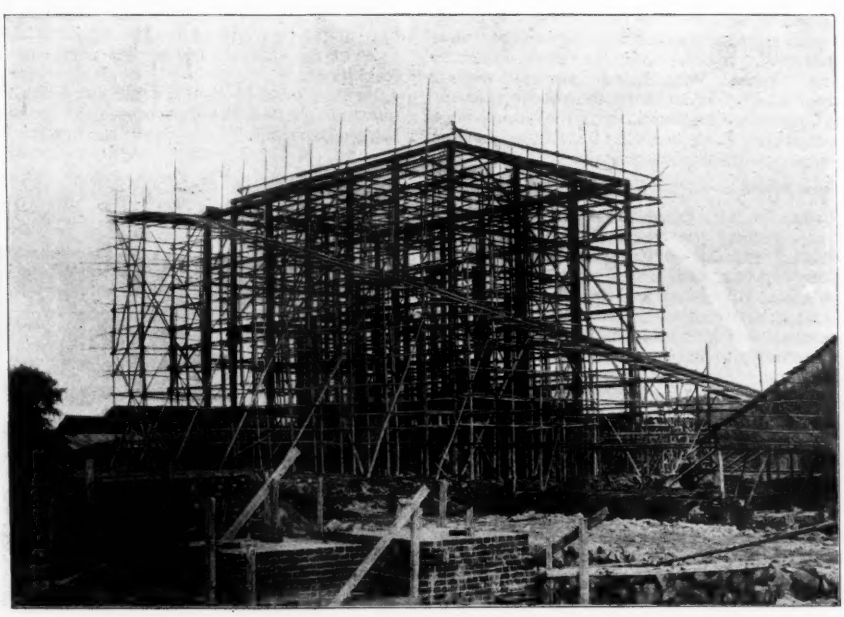
Meters.—With regard to meters, both wet and dry are in use; but it is the Engineer's intention to use dry throughout. Mr. Sakai intends eventually to introduce slot-meters into tea and lodging houses. At present gas is consumed by the upper and middle classes only, not by the working or labouring classes, who use kerosine and charcoal, which are much cheaper.

Quality of Gas.—The standard candle-power is 15·5, tested by the jet photometer; there being no test by the Municipality nor exacting clauses to bother about.

Show Rooms.—The show rooms are above the offices, and fitted with heavy wooden glass cases, which, unfortunately, exhibit the cases in preference to the goods inside. The whole thing appeared out of the way for a customer and much more like a museum than a sales room. If the Japanese idea is to store, schedule, and label the goods in a top storey of a building in an unfrequented part of the town, then business cannot be expected. Mr. Sakai should take a shop in one of the main thoroughfares and exhibit his goods there, and show the people how to use the various classes of gas apparatus. Then he should find a difference in the consumption. Let him try it.

Hints to Manufacturers.

The question of incandescent burners, stoves, and fittings in general has not as yet had Mr. Sakai's serious attention, as his time has been occupied with the designs of his new works. But he informed the writer that if any firm of manufacturers would only study the requirements of the Japanese with regard to the most suitable burner or fitting to introduce, so as not to interfere with their present customs and method of living, then the firm would do well. At present, many firms are sending catalogues of their designs of burners and stoves, which are absolutely no good in Japan. If a European firm wishes to capture the Chinese or the Japanese gas trade, it would be necessary for some man of experience to visit these countries, and study thoroughly their methods of cooking and their requirements in artistic lighting. The Japanese design of artistic decoration (as mentioned before) does not demand a brilliant light; and therefore small drop lights consuming very little gas per cluster would be the most serviceable. For shops, &c., of course, other styles would have to be introduced. Suffice it for the writer to offer his advice to gas-fittings manufacturers in saying that, for the heavy, powerful style of European burner, whether for house or street, there is no great market. If the general trade is worth having, it will pay to go into the matter properly; and if it is not worth doing well, then do not waste money in sending European catalogues of apparatus. That is of no use.



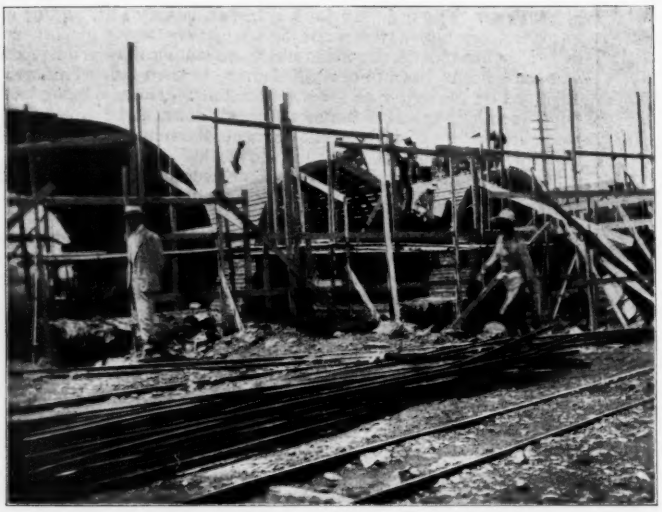
Photograph No. 161.—Scaffolding for Erecting the Steel Joists of the Retort-House.

The Japanese and their Requirements.

Before proceeding to the new works, a few hints from Mr. Sakai as regards the Japanese and their requirements may be given: (1) The average height of Japanese workmen being 5 feet, all accessible parts of machinery should be designed to suit, so as to be more easily handled. (2) Heavy brick buildings and tall brick chimneys should be avoided, because in Japan earthquakes and shocks are frequent and severe, as the writer has experienced during his tour. (3) Mechanical working parts should be made as simply as possible, and, above all, avoid minute cautions. Any machinery that requires a huge printed notice board, with a long list of "Don'ts," is no good in Japan, as the workmen, first of all, cannot read them, and, secondly, won't. (4) The low price of labour is such that it does not pay any company at present to recommend capital expenditure on machinery merely to save labour, besides which the interest on the outlay would be exorbitant. Many banks charge 7 per cent. for their loans in this country, and that is why all industrial companies are expected to pay on a 10 per cent. basis, whereas in England a 5 per cent. basis is quite satisfactory for investment. England has stability, experience, and assets in her enormous industrial and colonial wealth. Industrial Japan is but 40 years old, and has only just started, and must, therefore, pay more heavily for her industrial local loans, as her stability, as an annual profit-bearing concern, is an unknown quantity, though perfectly safe as an asset.

As long as Japan can adhere to the present method of living, and keep its present customs, then there is no necessity for higher wages, and, consequently, no necessity for borrowed capital for labour-saving machinery. But immediately she changes wholesale to European clothing, food, and customs, then wages must go up in keeping with the increased cost, and labour-saving machinery must enter the country. At present, every man has work and food and the necessary clothing, and no one can see any signs of poverty.

Just a word about the tools used by artisans, &c. In a previous



Photograph No. 162.—Brick Arches in Course of Construction for Carrying the Purifiers, instead of a Steel Structure.

article, the writer mentioned that there were more ways than those adopted in England for doing the same work, and gave, as an example, joiners' tools. He now wishes to illustrate the fact, which has been explained to him, that the Japanese find it necessary, owing to their small stature, to take advantage of the power of tension in every movement, instead of force or compression as adopted in Western civilization. Thus, their digging or shovelling is all done with a tool like an adze, which they force into the ground and then pull, practically accomplishing the same as one would in Europe by digging. Their method of scientific jiu-jitsu wrestling is another example of the same principle.

Hiranuma New Gas-Works, Yokohama.

It is anticipated that in the near future the present (Hanasaki-cho) gas-works' site will become the centre of the City of Yokohama, which is extending rapidly on European lines. Consequently, it has been decided that all the present gas plant will be removed to the new works at Hiranuma, and the old works remain as merely a holder station, distributing office, and general show-rooms. The river or canal, being of such small importance to a city of this size, and running almost parallel to the sea front, will be reclaimed and built upon. The astonishing difference between the Japanese quarter and the European settlement should open the eyes of the Japanese Government to the fact that it is absolutely impossible to allow such ramshackle, cheap, wooden buildings to remain on land which is of such great value in a seaport town. Either the Japanese merchants must build larger and more commodious warehouses, or else go into the interior where land is cheaper.

Mr. Sakai has made the designs for his new works, and has based his extensions on the following estimates:—

Land (about 10,000 tsubo, or 360,000 square feet)	yen 140,000
Reclamation work	10,500
Foundation works	62,713
Retort-house	29,515
Retort-bench	88,268
Retort-chimney	5,597
Buildings	39,870
Apparatus and machinery	88,843
Gasholder	101,625
High-pressure main	12,000
Improvement of street mains	30,000
Salaries and sundries	9,095
Reserve money and contingencies	8,973
Total (say)	yen 627,000

This amount is equal to £62,700; and a glance at the accepted tenders shows that they will be well within the figure estimated and granted by the Municipality.

It may be of interest to give the following list of some of the makers of the plant to be erected.

Messrs. Ashmore, Benson, Pease, and Co., Limited, are supplying the retort-house steel structure, four annular condensers, three water-tube condensers, and four purifiers, 20 ft. by 16 ft. by 5 ft., with lifting apparatus, valves, &c.

Messrs. Drakes Limited provide the inclined-retort bench and fittings, with coal-handling plant, hopper, and charger.

Messrs. George Waller and Son send two rotary exhausters, each of 30,000 cubic feet per hour, directly coupled to a steam-engine; also two other exhausters for high-pressure supply.

Messrs. W. C. Holmes and Co. furnish two Pelouze and Audouin tar-extractors.

Messrs. Kirkham, Hulett, and Chandler, Limited, supply a "Standard" washer.

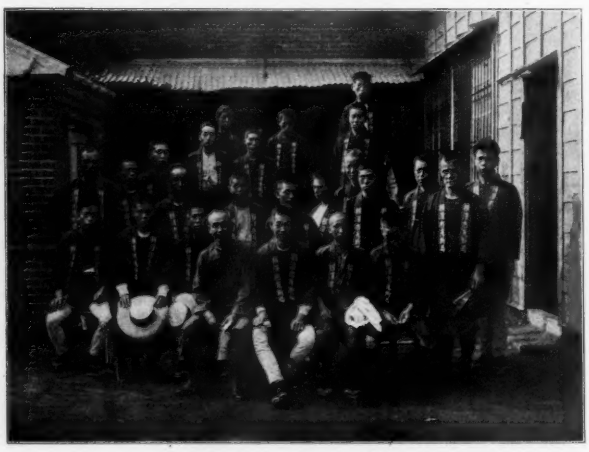
Messrs. Thomas Glover and Co. provide a station meter of 50,000 cubic feet per hour.

The retort-house steel chimney and two Cornish boilers are of local make. There will also be a two-lift gasholder, with outside framing and steel tank, of a capacity of 600,000 cubic feet. The pipe connections throughout are to be of 18 inches diameter.

When the writer went [in August] round the new works in course of construction, he was astonished to hear that it was anticipated that gas would be made by Dec. 1, 1908. This could be nothing short of suicidal, as the retort work and all other plant lying on the ground would have to be erected and dried in the short space of three months. The Municipal regulation states that the gas-works' level must finally be 4 feet above high sea-water mark; and to effect this 9 feet of subsoil will have to be filled in. As is usual all over Japan, the ground is water-logged; and therefore pile-driving has to be resorted to whenever a solid foundation is required. Photograph No. 160 shows this in course of procedure for the foundation of the gasholder tank, and one notices the little Japanese women working at the pile-driver. All piles are 27 feet long, made of 9-inch diameter timber, well shod at the points.

Having inspected the plans, Mr. Takamatsu, Clerk of Works, accompanied the party round the ground. The steel structure of the inclined retort-house was being erected, to contain four beds of nine retorts, 15 feet long, set at an angle of 32 degrees. The cost of erecting the structure is yen 30 (£3) per ton. Mr. Sakai was surprised when the writer informed him that this price would be a gold mine to a British erector. The cumbersome manner and the enormous network of scaffolding, as seen in Photograph No. 161, for erecting a few steel joists, make one remark that some lessons could yet be taken with advantage by the Japanese contractor. Two derrick poles, some sling ropes and a winch, would be the only equipment of a British erector; whereas the scene resembled the scaffolding that might be required for Westminster Abbey; and the writer thought the value of the timber would be equal to that of the steel joists.

Passing onward through the fire-brick and retort stores, a question elicited the answer that only two retorts in all were broken in transit. Local Japanese fire-bricks will be used except



Photograph No. 163.—Yokohama Gas-Fitters with their Occupation Written in White Lettering on their Clothes.

in the combustion chambers and interior of the settings. Drakes regenerator tubes have all been shipped from England.

The Japanese bricklayer lays 2000 red bricks in foundation work, or 1000 in piers above ground, or 800 fire-bricks in piers of bench, or 450 furnace arch bricks in a twelve-hour day for the sum of yen 1·20 (or 2s. 5d.); his labourer receiving 1s. 3d. per day. The standard size of brick used is 9 in. by 4½ in. by 2½ in. The price of local hand-made red bricks is 36s. per 1000; those made by machine commanding a higher price. The mortar in all red brick work is made of cement. The joints are not a particular feature, and, therefore, there is not that finish about the brickwork that is demanded in England.

Looking round, one sees nothing but foundations, and so there is nothing much to describe; but Photograph No. 162 may be of some interest as showing brick arches to be used for supporting the purifiers, instead of steel structural work. Adjacent to the gas-works there will be a neatly-designed Japanese house suitable for the Engineer and Manager, as these works will then become the head manufacturing centre.

There is a good custom, which may be mentioned, among Japanese workmen which conduces to a cleanly and tidy appearance. It is that skilled workmen or traders have the name of their occupation or trade printed on their clothes in white characters. The workmen shown in Photograph No. 163 are gas-fitters.

Mr. Sakai is assisted by an able body of young and enthusiastic gas engineers, who are alive to the fact that the gas industry is only in its infancy in this country, and that at present there are only about seven or eight gas-works; whereas there are many towns where gas-works will be erected directly the financial

depression has passed over. Therefore, their services in the near future will be required in these new works.

The Municipality of Yokohama have as Chief Engineer of their gas-works, a scientific and practical man, who does credit to the position that he now holds, and, if opportunity occurred, would certainly be selected for the management of larger works. His genial and polite manner to one and all makes it most pleasant to converse with him on the all-absorbing topic of gas. Thanks are due to Mr. Sakai for the information contained in this article, and for many of the photographs reproduced.

VERTICAL RETORTS FOR BURNLEY.

Mr. Leather Reports in Favour of the Woodall-Duckham System.

The following is the text of the "Further Report on Vertical Retorts" which (as recorded in our "Miscellaneous News" columns to-day) has been submitted by Mr. J. P. Leather, the Engineer of the Burnley Gas-Works, to his Committee, and acted upon by them, and subsequently by the Town Council.

Gentlemen,—In accordance with your request, I have pleasure in presenting a further report on the proposed adoption of vertical retorts, and on my recent visit to Berlin. The importance of this question lies in the fact that there is a general concensus of opinion that some of the ideas with reference to carbonization hitherto prevailing must be entirely changed if progress is to be made. A well-known American Gas Engineer—Mr. Frederic Egner—recently stated that, in view of the results obtained in vertical retorts, he thought it "a waste of time to discuss the horizontal retorts in any shape, with or without machinery for large, medium, or small works; and the sooner all concerned wake up to these facts, the better for gas companies and their stockholders." It is not everyone who would commit himself to so strongly-worded an utterance; but this expression of opinion is interesting.

In my journey and visit to Berlin that which impressed me most strongly was the large number of new works being erected in Germany, and the thorough way in which they are adopting the most up-to-date appliances in everything. If England is to maintain her position, it is evident that we must not cling too conservatively to old methods. Vertical retorts have passed the experimental stage, and are being adopted in nearly thirty gas-works on the Continent. The English systems of vertical retorts differ in some important respects from those in use in Germany. Before, however, considering these differences, it is well to understand why the putting of the retort in the vertical position is of importance.

Almost from the inception of coal gas manufacture, it has been considered essential for good working that the coal in the retorts should be arranged in a thin layer, with a space above the layer for the passage of the gas, as it was evolved from the coal. The whole claim of the Coze patent for inclined retorts rested on the practicability of obtaining this result in a retort set at an angle of about 30° with the horizontal. This idea is now being given up, and inventors are turning their attention to various ways of working with the retort completely filled. The horizontal retort does not lend itself readily to a full retort, on account of the difficulty of removing the coke. The retort must therefore be either set upright or erected at a steep angle, as is now being done in several works in England, under the patents of Mr. Love, of Guildford. I visited the installation of these retorts at Guildford in May last. They are set at an angle of 45°, and work very smoothly; the arrangements being simpler than those in the German system of verticals. The carbonizing conditions being the same, the results are, of course, similar.

The German vertical retorts which we saw at Berlin are 16 ft. 5 in. long. The settings are supported on steel stanchions at such a height that a man can walk underneath them. The top and bottom of the retorts are closed by hinged lids; but the arrangements for opening and closing the bottom lids are of a special character. When the retort is filled with coal, it will be seen that the weight of the coal rests on the lid. When the lid is opened, the whole charge of hot coke at once falls out. An arrangement of shafts and gear is provided; so that the operator can open and close the lids by turning a wheel at the front of the setting. Any one of the ten retorts in one setting can be operated by one wheel; the particular retort lid to be opened being determined by the position of certain levers which give longitudinal motion to the shafts on which are projecting feathers. The gear is somewhat complicated to describe without a diagram, but is simple and smooth in its working.

The coke falling from the retort is directed by a movable shoot on to a conveyor, which removes the coke from the retort-house. The bottom lid being replaced, the operator working on the top puts a small quantity of coke breeze into the retort, to fill up the bottom mouthpiece, where the temperature is not hot enough to carbonize the coal. The retort is then filled up with coal. The charge remains in the retort twelve hours, instead of the four to six hours usual with horizontal or inclined retorts. As the retort is full of coal, the gas of necessity leaves the retort as soon as formed; there being no space in the retort in which its passage can be delayed. The heavy hydrocarbons in the gas are not therefore acted upon by heat to the same extent as in the ordinary horizontal or inclined retort, in which there is a space over the coal. This absence of overheating has, as compared with horizontal and inclined retorts, a threefold effect: (1) It conserves in the gas hydrocarbons which in the older system are destroyed, and thus greater heating power is obtained in gaseous form. (2) The tar is thinner, containing very little naphthalene and very little "free carbon." It fetches in Germany 25 per cent. higher price. (3) The ammonia from the coal is not decomposed to the same extent; and the quantity is therefore increased 25 to 30 per cent.

The German engineers are apparently not satisfied with these results, but have been experimenting with chambers much larger than the usual retorts. One of these experimental settings we saw at Berlin; but there did not appear to be any advantage over the ordinary vertical retorts. At some other works in Germany, large inclined chambers are being tried, approaching bye-product coke-oven practice. From a careful consideration of what has been accomplished in this direction in America and in other countries, I have formed the opinion that no substantial advantage is likely to be gained thereby.

To return to the vertical retort, there does not seem to me any advantage in the German style over the inclined retorts set at 45°, as at Guildford. In both cases the retort is filled full of coal, and can be readily charged and discharged. If no further advantage could be obtained, I should be inclined to recommend the erection of retorts on Mr. Love's (Guildford) system.

The system of vertical retorts which I have recommended to the Committee is that known as the Woodall-Duckham, and differs from the German system in that it realizes what has for a long time been felt by many English engineers to be the *desideratum*—continuous carbonization. On our present system, coal is received into the works and handled in large quantities. It is then divided up into small charges of a few hundredweights, each of which are put into hot retorts to the accompaniment of much dust and smoke and loss of gas. Again, the hot coke has to be handled in such a way as to subject the men employed to heat and steam. In the Woodall-Duckham plant, the coal passes through feed rolls into the retort, without any smoke or flame or loss of gas. The coke is taken out after being allowed to lose the greater part of its heat, so that no inconvenience or nuisance arises. This absence of smoke and steam is of especial importance for a works like ours, which is situated in the heart of the town.

The arrangement of the retort is similar to that of the German plant; but the retorts are larger. Instead of being 16 ft. 5 in., the length of the retorts is about 25 feet; and they are arranged in settings of four instead of ten, as in Germany. The cross section of the retort is 24 in. by 10 in. at the top, and 30 in. by 22 in. at the bottom. The Germans heat their retorts hottest at the bottom. The Bournemouth retorts are hottest at the top. The German retorts produce about 15,000 cubic feet of gas per day, the Bournemouth retorts 30,000 to 40,000 cubic feet per day.

The coal, as in the German system and our own existing inclined retorts, is elevated into overhead hoppers. From these it passes in a slow stream into the feed rolls, one of which is attached to the top of each retort. The feed rolls are 12 inches in diameter, and revolve three times per minute, keeping the retort full of coal without allowing the gas to escape. At the bottom of the retort, instead of the usual mouthpiece and lid, is a large cast-iron extension of the retort, containing a small shaft revolving very slowly—say, about twice an hour. This shaft has on it projections which cause the coke to move horizontally and fall into a discharging roll below. The speed of rotation of this shaft can be very exactly controlled; and by this means the quantity of coal being carbonized in the retort is regulated. A small quantity of water is allowed to trickle into the chamber just above the shaft; thus preventing the ironwork being unduly heated, and to some extent cooling the coke, which is no longer red-hot when it emerges from the discharging roll. This roll is a cylinder 2 feet in diameter, and 2 ft. 6 in. long. Normally its open side is upwards to receive the coke falling from the retort. At intervals, when about half full of coke, the drum is rotated to allow of the coke falling into a waggon or on to a conveyor for removal from the retort-house. The arrangement is such that the retort is not open during the act of rotation, so that there is no escape of gas from, or admission of air to, the retort.

The advantages to be obtained by the adoption of this system are as follows:—

(1) Increased make of gas per ton. At the Nine Elms works of the London Gaslight and Coke Company, 12,423 cubic feet of 15·82-candle gas were obtained from a coal no better than, if as good as, Burnley coal. At Poole, with coal somewhat inferior, 14,165 cubic feet of 14·16-candle gas were obtained. The illuminating powers required in the South of England are less than we are accustomed to work to; but allowing for this, we may expect to obtain the equivalent of an increase of 10 per cent. on our present make.

(2) Improved quality of tar, due to the smaller quantity of naphthalene and "free carbon;" while the quantity of tar appears to be about 5 per cent. greater.

(3) Increased yield of ammonia of about 25 per cent.

(4) Improved quality of coke.

(5) Absence of trouble from "stopped pipes" and pitched-up hydraulics. This advantage, which has a direct pecuniary value, is common to all systems where the retort is charged full of coal. Under our present system, men have to be constantly employed on the unpleasant work of clearing

stoppages, &c.; and stoppages often entail loss of gas and deterioration of retorts. In the Woodall-Duckham system, the hydraulic main and ascension pipe are entirely done away with.

(6) Increased make of gas per retort, and in proportion to ground space occupied. The new retort-house now being erected, with inclined retorts arranged in four tiers, would only produce about 2,160,000 cubic feet per day; while fitted with verticals, we may expect to make 2,700,000 cubic feet per day. This means an important saving in capital cost.

(7) Absence of dust and smoke, and therefore better conditions for workmen, and reduced nuisance to neighbourhood. This important advantage I have already dwelt upon.

(8) Reduction in heavy labour. The work of drawing and charging the retorts is practically done away with. The chief labour being the removal of the coke and the charging and clinkering of the furnaces.

(9) Reduced cost of maintenance. The increased life of retorts set vertically, and the reduced wear and tear on tools will much more than compensate for any slight increase due to the small amount of extra machinery.

The price quoted by the patentees is £10,800 for nine settings, which will occupy one-half of the new retort-house. These nine settings I estimate will produce 1,350,000 cubic feet of gas per day, which is at least 25 per cent. more than would be produced in the same space with inclines.

The estimated cost of the retort-house and retorts complete, as originally designed to accommodate 144 inclined retorts, and produce 2,160,000 cubic feet of gas per day, was £21,000. If the retort-house is fully equipped with the vertical retorts, the capacity will be about 2,700,000 cubic feet per day, and the cost about £29,500. If allowance is made for the increased capacity on the same ground space, the extra cost is only about £2600 for the plant to make 2,160,000 cubic feet per day. The cost of producing gas by inclined and vertical retorts respectively is shown in the following statement:—

Cost of Producing 1,350,000 Cubic Feet per Day.

With Inclines—108 Retorts.

	£ s. d.	£ s. d.
129 tons of coal		74 3 6
Wages in retort-house		8 18 6
		£83 2 0
Less residuals—		
58 tons of coke	26 2 0	
165 cwt. of tar, at 20s. per ton	8 5 0	
30 cwt. sulphate of ammonia	12 15 0	
		47 2 0
		£36 0 0

With Verticals—36 Retorts.

	£ s. d.	£ s. d.
113 tons of coal		64 19 6
Wages in retort-house		4 1 8
		£69 1 2
Less residuals—		
50 tons of coke	22 10 0	
150 cwt. of tar at 25s. per ton	9 7 6	
31 cwt. sulphate of ammonia	13 3 6	
		45 1 0
		£24 0 2

This shows a saving of more than £12 a day, or 2·1d. per 1000 cubic feet, when only one-half the retort-house is working. This will much more than repay the extra cost of the settings in the first year of working.

In the above estimate of cost I have not taken the full claims of the patentees, but have formed my own judgment from seeing the working of the plant and the results obtained. There are also several savings which it is a little difficult to give monetary value to, which are not taken into account above. For example, the absence of naphthalene in the gas. This, which at present costs us from £50 to £100 per annum, will be entirely got rid of. Again, attendance on the hydraulic mains costs us about the same amount, and is not included in the cost of gas made by inclined retorts given above. I have not included the cost of maintenance, which would be less.

The above figures are so favourable to the new system that, after inspecting the latest installation at the Nine Elms works of the London Gaslight and Coke Company, I have no hesitation in recommending the Committee to enter into a contract for the erection of the 36 retorts tendered for.

Income-Tax on Municipal Undertakings.—In the House of Commons last Friday, Mr. Sears asked the Chancellor of the Exchequer whether corporations and other municipal authorities were all charged income-tax on revenue derived from gas, tramways, electric lighting, and other undertakings; if so, whether payment was enforced in all cases; and, if not, whether he would furnish a return of the public bodies who were in arrears for such taxes. Mr. Lloyd George replied in the affirmative to the first and second parts of the question.

A NEW WOOD POWER GAS.

In concluding an instructive lecture on "Ancient and Modern Methods of Artificial Lighting," before the Stockton-on-Tees Literary and Philosophical Society, Mr. Matt. Dunn, Assistant-Manager at the Gas-Works, referred to a new wood power gas, known as the Brooks Dual Wood and Charcoal Gas.

He had, he said, been watching and testing the new process in conjunction with Professor Vivian B. Lewes. Demonstrations had been given over a period of six weeks at the works of the Mond Gas Company, at Stockton; and he had been astonished at what he had seen. It was the cleanest gas he had ever come in contact with. Gas-engines were attached to the plant; and when, after working a considerable time, an examination was made, the valves and combustion chambers were found to be absolutely clean. There was not the slightest trace of soot anywhere. They could not claim this much for Mond gas or coal gas either. Apart from his own observations and conclusions, he knew that Professor Lewes was very much taken with the plant. An absolutely blue, almost non-luminous, gas was given off, which, however, became highly incandescent the moment it was applied to a mantle. This proved the argument advanced by him at previous lectures—viz., that what was required to-day was not a high-quality 17 or 18 candle power coal gas, but a low-quality blue gas of from 12 to 14 candles, as being eminently suitable for incandescent lighting; the calorific value being more valuable for perfect incandescent lighting than the illuminating value of the gas applied.

Reverting to the process of manufacturing the new gas, Mr. Dunn said that ordinary wood—ash, elm, pitch pine, &c.—was used; much of it being what is known as waste wood. Yet it yielded anything from 13,000 to 20,000 cubic feet of gas to the ton of wood, as compared with the 9000 or 10,000 cubic feet per ton of coal in the manufacture of coal gas. He added that a Syndicate was being formed to work the plant; but owing to the scarcity of wood in this country, the new industry would in all probability be established in, and confined to, one of the Colonies.

SOCIETY OF ENGINEERS.

At the Fifty-Fourth Annual Meeting of the Society, held at the offices, Victoria Street, Westminster, on Monday last week, under the presidency of Mr. J. W. Wilson, M.Inst.C.E., the following gentlemen were elected by ballot as the Council and officers for the ensuing year: President, Mr. E. J. Silcock; Vice-Presidents, Messrs. D. A. Symons, A. G. Drury, and F. G. Bloyd; as ordinary Members of Council, Messrs. T. E. Bower, R. W. A. Brewer, A. W. de Rohan Galbraith, Percy Griffith, J. Kennedy, N. Scorgie, H. C. H. Shenton, and W. A. Valon; Hon Secretary and Treasurer, Mr. D. Butler Butler; Hon. Auditor, Mr. Samuel Wood, F.C.A. The President announced the premiums awarded by the Council for papers read during the past session; and the proceedings closed with a vote of thanks to the President, Council, and officers for 1908.

The annual dinner was held at the Waldorf Hotel on Wednesday evening—Mr. Wilson in the chair. The loyal toasts having been honoured, that of "The Imperial Forces" followed, and was responded to in excellent speeches by Admiral Sir Edmund Fremantle, G.C.B., and Lieut.-Gen. D. Hutchinson, C.S.I. The former laid stress upon the importance of still further strengthening the Navy; and the latter emphasizing the advisability of engineers associating themselves with this branch of the Territorial Army. The toast of "The Society of Engineers" was proposed by Sir Alexander Binnie, who referred to the gratifying facts that the membership was increasing and that the finances were in a flourishing condition—so much so, indeed, that the Society had a reserve fund which was very creditable. He urged the members to do their utmost to raise the profession of engineering to the position it should justly occupy. The President, in responding, mentioned that an amalgamation was in contemplation next year with the Civil and Mechanical Engineers' Society; and that arrangements had been made to offer the members practical, legal, and general assistance. The President-Elect (Mr. E. J. Silcock, M.Inst.C.E.) proposed "Kindred Institutions," to which Mr. W. M. Mordey, the President of the Institution of Electrical Engineers, responded. During the evening a selection of music was performed under the direction of Mr. Murray Rumsey.

Unprofitable Municipal Electric Lighting in Chicago.—It appears, from some remarks in the "Engineer," that Chicago's experience with a municipally owned electric light plant has been like that of most other American cities which have made similar ventures. The report of the experts who have examined the plant is that Chicago would save from $200,000 to $300,000 a year by abandoning it, and purchasing current from the private companies. According to the last returns, it cost Chicago £17 to maintain each of its municipally lighted street-lamps. At the same time the authorities were renting lights from a private company at about £15 13s. 4d. per annum; and it is estimated they could purchase current on a large contract at from £11 to just over £13 per lamp. Nor is this all the loss. The plant cost £727,806, and is now worth only £470,793.

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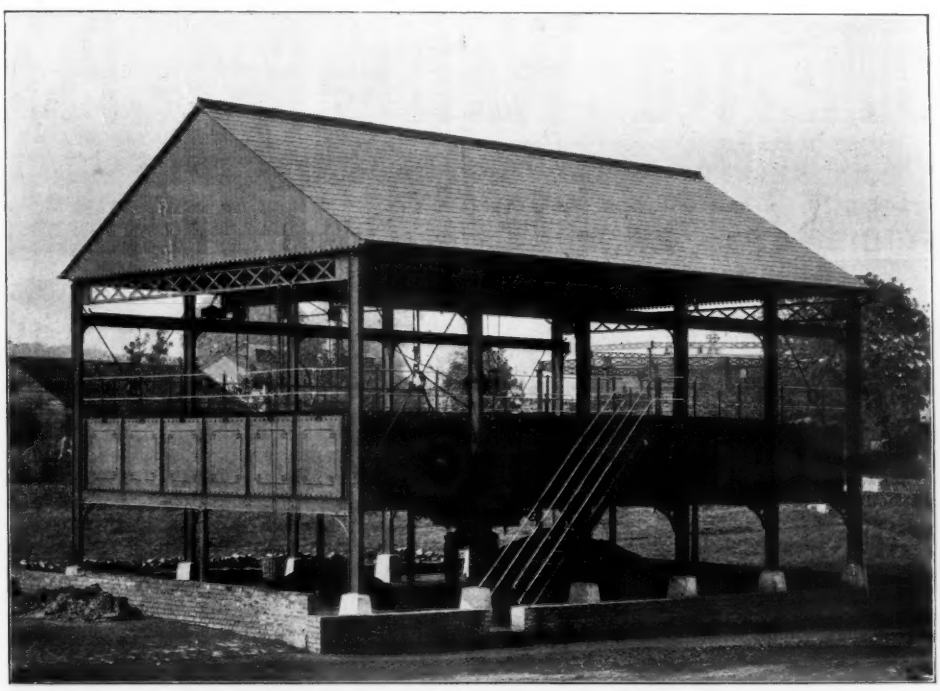

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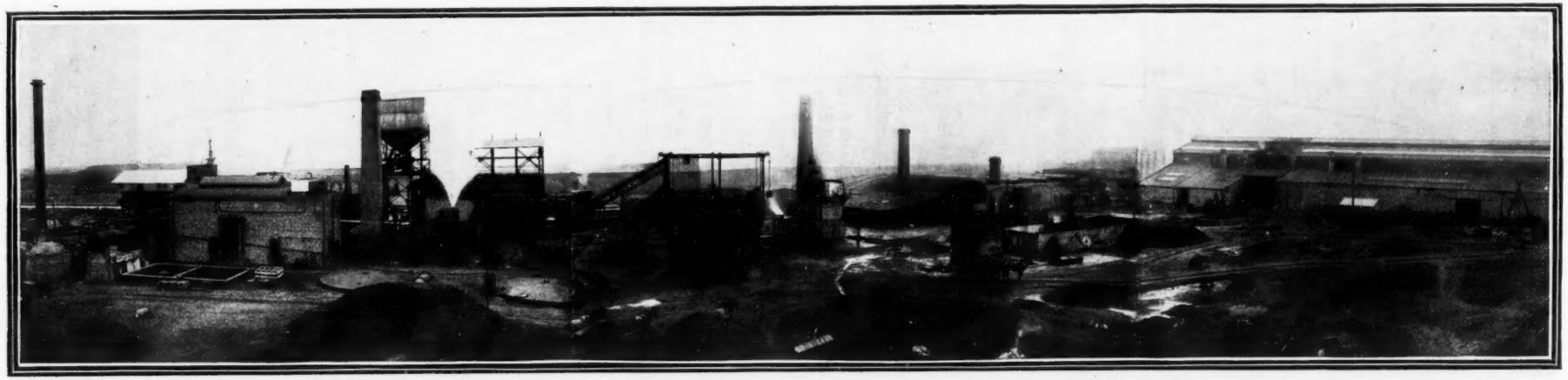
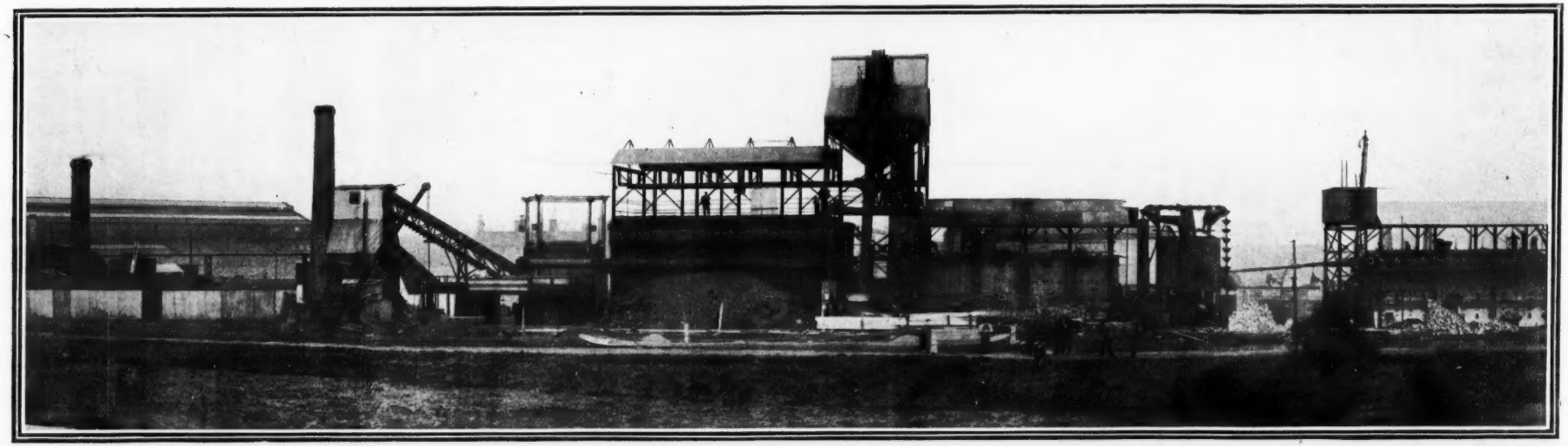
[From "THE SPHERE," Dec. 5, 1908.]



BIRD'S EYE VIEW OF THE COALITE WORKS AT WEDNESFIELD AS SEEN FROM THE TOP OF THE POWER HOUSE.

Reading from right to left, the chief buildings are: The foundry, laboratory, gas-retort, coal-distilling plant, and (on the extreme left) the tar-distilling plant.



A VIEW OF THE BRITISH COALITE COMPANY'S WORKS AT WEDNESFIELD, STAFFORDSHIRE, FROM THE OTHER SIDE OF THE CANAL.

Showing, from left to right, the foundry building and three coal-distilling plants. That on the extreme right is now in course of construction.

REGISTRATION OF PLUMBERS.

Association of Water Engineers.

The General Business at the Winter Meeting of the Association of Water Engineers was reported in last week's issue; and before dealing with the papers read, we may refer to the discussion that took place on the Registration of Plumbers. It was initiated by Mr. Percy Griffith, in his capacity of Secretary to the General Council for the National Registration of Plumbers.

Mr. GRIFFITH said that he would deal first with the matter historically, and afterwards make a few observations which he hoped would assist in provoking discussion, and at the same time direct the members' attention to a movement in which many of them were very practically interested. At the present time, the movement for making the registration of plumbers national stood on a new basis; a new body having been formed to conduct the administrative machinery connected with it. That body bore the title of the General Council for the National Registration of Plumbers. Since its formation, the Council had appointed a Managing Committee to carry out the details of the administrative work. The interest of those present would be centred upon that at once when he told them that Mr. Easton Devonshire had been elected Chairman of the Committee—at any rate, for the coming year. In the past, he believed, many of the members had been interested in the question of the registration of plumbers; but he was afraid that their interest had not altogether been of the right sort. The movement had until recently been exclusively carried on by the Worshipful Company of Plumbers. But for many reasons, and in the absence of explanation, much misunderstanding had arisen with regard to the carrying out of this important movement; so that, unfortunately, there had been from various quarters rather more criticism than was really deserved. The basis of the criticism was a matter he would rather avoid dealing with for two reasons: One that he thought they might fairly claim that such criticism was now unnecessary; and, secondly, because, owing to the multifarious points of view from which the matter had been regarded, the criticisms were of too complex a nature to be adequately treated in the time at his disposal. The main purpose for which he was addressing the members was rather to point out and emphasize the object with which this reorganization of the movement had been carried out. This was that whereas the Worshipful Company of Plumbers had represented primarily the plumbing trade, the General Council which had now been formed would, and did, represent not only the trade interests, but to an equal extent the public interests of all kinds.

He thought it would be worth while calling attention to some of the features of the work which the Worshipful Company of Plumbers had carried out, before leading the members to consider the enlarged sphere of work undertaken by the new Council. The Worshipful Company of Plumbers was a very ancient City Guild, which had a Charter granted many hundreds of years ago. Their position had been remarkable among the City Companies, in that the Company had attempted to maintain the purposes for which it was originally formed. The point which had to be borne in mind in connection with the trade of plumbing was that the conditions affecting the trade had changed considerably in recent years; and it had not been a simple matter for the trade, *quâ* trade, to keep pace with the advances of modern sanitary science. The Worshipful Company had, in spite of many difficulties, done a great and valuable work. One point connected with their new organization required emphasis, because it would explain the reason for utilizing the resources of the Worshipful Company in connection with the future development of the movement. Through their ancient Charter, the Company had statutory powers which no other body interested in the movement had at the present moment. He would, in passing, refer to another point, so as to avoid any possible confusion in the minds of members. Although similarly initiated by the Worshipful Company of Plumbers, the functions of the Joint Committee on Water Regulations must not be in any way confused with the movement for the National Registration of Plumbers. The Joint Committee had so thoroughly incorporated all the other interests involved, that the influence of the Worshipful Company of Plumbers upon the movement had been reduced to very small proportions; and as it now stood, the Regulations Committee were practically in the hands of the water engineers of the country, and especially in those of members of the Association. He only mentioned this in order that in the discussion there should be no confusion of the two movements. It was no doubt possible that in the future the question of the registration of plumbers would ultimately be a feature of water regulations; but for the moment this point did not arise.

Returning, then, to the question before the meeting, the new feature in the movement was the representation of the public interest, and, of course, in this term it would be understood was included primarily the public health, the public convenience, and, of course, all general questions of public benefit. The interests of the public were now represented both on the new General Council and on the Managing Committee equally with those of the trade. They had representatives of the Royal Institute of British Architects, the Society of Medical Officers, the Incorporated Association of Municipal and County Engineers, the Association of Technical Institutions, and the Association of Water Engineers. The three general divisions into which the public interests might be classified in regard to plumbing work—viz., the architects and builders, municipal and sanitary authorities, and water authorities—were thus fully represented. The functions which would be retained by the Worshipful Company of Plumbers were those which could only be exercised under the powers conferred by its ancient Charter, and which were not possessed by any other body, but which were essential to the carrying on of the movement. Unless the registration system was protected, at any rate theoretically, by statutory authority, it could not, of course, be carried on in a proper way. The object being to secure certain necessary qualifications on the part of plumbers, it was obviously necessary to prevent work being done by unqualified plumbers; and the powers the Worshipful Company possessed, of taking proceedings against plumbers who were convicted of executing defective work—at any rate of preventing them from using the distinguishing letters "R.P.," meaning Registered Plumber—were of the utmost importance in securing the moral and practical success of the movement. While he did not suggest that any movement could be successful that had to depend upon a succession of legal actions, it was clear that the moral influence of the powers possessed by the Worshipful Company of Plumbers would undoubtedly be very useful in ensuring the success of the new organization.

With regard to the Bill that had been promoted for dealing with this question, a Bill which had been before the public for a good many years, and which had been actively promoted by the Worshipful Company of Plumbers, while he did not propose to detail the nature of the measure or its provisions, he wanted the members to understand clearly that the power of the Worshipful Company of Plumbers with regard to legal actions was not dependent upon this particular Bill. It was not impossible that in the near future some such Bill, or at any rate a Bill of a more practical nature, might be promoted; but legislation of this nature was not really an essential part of their present programme. He mentioned this, because he knew that many engineers had a strong objection to the Plumbers' Registration Bill. He thought the position in connection with this was much the same as that represented to the Joint Committee on Water Regulations when the matter was under discussion with the officials of the Local Government Board. The general attitude of the Government Departments on such questions was then very clearly enunciated. It was that the Government would never themselves undertake any legislation of this character until they were assured of two things: First of all, that it received practically unanimous support from all the parties interested; and, secondly, that in practice it was both feasible and desirable. Now, the second point involved what appeared to be, at first sight, an anomaly. They seemed to be told to go away, and get what was wanted done, and then to go to Parliament and secure compulsory powers to carry it out. But though this at first sight seemed anomalous, it was really a very practical position for the Government to take up. And he thought that those of them who at first criticized it had since come to the conclusion that the method therein suggested was that which was likely to be most successful. And it would probably prove to be the same with regard to the promotion of any Bill dealing with the national registration of plumbers—viz., that it would be best for them to establish their proposed system of registration and then,

when experience had shown the extent to which legislation was necessary and desirable to assist the movement, legislation could be promoted on practical lines, and no doubt the Government Departments (who were perhaps more constant than any Government) would be prepared to take the matter up, and support the Bill. This, he thought, would remove from the minds of members any fear that the support of this movement would involve the support of any particular Bill.

He would classify the main objects with which the new General Council had been formed, as follows: viz., firstly the protection of the public interests affected by plumbers' work generally, and, secondly, the protection of the plumbing trade as such. It was admitted that there were connected with this movement many conflicting and some competing influences. It was undoubtedly a difficult, but by no means an impossible, undertaking to reconcile these divergent interests; and he was very hopeful that if the movement secured more support from the public generally and from water engineers in particular, there could only be a successful result.

To go a little further into detail, he would refer to the practical work now undertaken by the new organization. The Worshipful Company of Plumbers had done a great deal in the direction he was going to indicate; and the new General Council could only complete and carry forward their work. It was hoped to establish a common and universal system for standardizing not only the qualifications of plumbers—of course, as far as that was possible—but also the requirements of public health and water authorities, including water engineers; and, on the part of plumbers, to facilitate their training both during apprenticeship and subsequently on their going into business as either masters or operatives. From the point of view of the water engineer, the hope was to provide an ample supply of thoroughly qualified plumbers in every district; so that there might be no difficulty in preparing lists of authorized plumbers from local sources. Another important point covered by the programme of the new organization was the supply of a ready means of identifying qualified plumbers, and distinguishing them from those who were unqualified. It seemed very desirable that water engineers should be assured as to the intentions of the General Council in connection with these points before they could be invited to definitely support the movement.

In regard to the authorized lists of plumbers, they knew the position was somewhat anomalous, in that some water authorities had absolute powers in regard to the preparation of such lists, even to the extent of excluding all other plumbers from work connected with the water supply; but there was a much larger number of small towns where the water authority had no such powers, and the lists of authorized plumbers were merely published for what they were worth, and only served as a guide to the public as to what plumbers were approved by the water authority, and not as a statutory obligation involving a penalty for default. The hope was that as soon as the new organization was able to provide an ample supply of qualified plumbers, whether (in the first instance) registered or not, it might be possible to secure statutory authority to all water authorities to restrict the plumbing work connected with the public water supply to those on the authorized lists. But it was very obvious that, unless water engineers were satisfied that they were going to get what they wanted, and again, unless the water engineers were prepared to assist in obtaining what they wanted, the difficulties of the movement would remain almost insuperable. In other words, they wanted not only to supply, but at the same time to create, a demand for the best work, and to induce water engineers to insist on the employment of qualified men in preference to those who were not qualified. If the movement progressed concurrently with the movement for the training and examination of plumbers on any standard of qualifications that might be required, success was possible. He was therefore speaking in the name of the General Council in asking the water engineers as a whole, and the members of the Association in particular, to look at the matter in this light, and give every possible assistance in the direction he had indicated.

Before concluding, he would say a few words upon the points referred to in the pamphlet that had been circulated among the members, and which would be published generally throughout the country. One or two of these were worthy of special emphasis—such as the fact that the health of the community at large depended on the plumber and his work to an extent that was only realized by those who had such work under their control. Another point was the fact that they were in this movement primarily concerned with the protection of the public and the water consumer, and that this question was not being promoted for their own advantage either as water engineers or plumbers, but in the interests of the public health. Water engineers were not employers of plumbers to such a large extent as the public, and the public therefore required some means of identifying good work from bad work, and good men from bad men. It was hoped that, by uniting so many interests (among which, of course, those of the water engineers were very conspicuous), it might be possible to give to all concerned the protection which was certainly needed, and to which they might have a legitimate claim.

He thought he had touched on all practical points that were likely to give rise to discussion; and he only asked permission to conclude with a reference to his own position in connection with the new body. His appointment as Secretary of the movement was made in August last, and was unanimous on the part of both the Committee and the Council. Although this fact was gratifying to him in a personal sense, he thought he might go farther and say that the appointment indicated the attitude of the new body towards the Association of Water Engineers; and if he personally could not go quite so far as to say it was a compliment to the Association, he thought the members would accept it as such, and he could assure them that this was the intention of the General Council. Looking forward to the future, with such a prominent member of the Association and of the Council as Mr. Devonshire as Chairman of the Managing Committee, and with the Secretary of the Association of Water Engineers as Secretary of the whole movement, he thought there could be no question but that the interests both of water engineers generally and of their own Association would be fully safeguarded, and, as in the case of the Joint Committee on Water Regulations, their influence would be exerted upon all the future developments of the movement.

Discussion.

The PRESIDENT was sure members would agree that it was beneficial to have such a subject as the registration of plumbers brought before the Association. He had no doubt it would promote an interesting discussion.

Mr. E. ANTONY LEES (Birmingham) said he was associated with this movement before it entered on the present phase. They had had a local Council in Birmingham for a long time. The first President was the Medical Officer of Health—their old friend, Dr. Hill. He was succeeded by the late Mr. John Price, the predecessor of their esteemed President, who was the City Engineer and Surveyor of Birmingham. At the time of the decease of Mr. Price, he (Mr. Lees) was asked to take the position; and he felt it to be his duty to do so. The movement from the commencement had in it three elements—the master, the working plumber, and the public representative. In some districts in the country, the element of the public representative had been well emphasized throughout; but in many other districts, registration had now drifted practically into a trade movement such as Mr. Griffith had referred to. The recent re-formation was intended to have the effect of further emphasizing the public element in the movement; and it was in this sense he apprehended it was brought before the members that day. He thought beyond the broad public interest in the matter as affecting the public health, water engineers or administrations had a very real selfish interest in the success of the movement. They all knew perfectly well that a considerable portion of the water they supplied ran to waste, by reason of faulty water-fittings. This was brought forcibly to his mind in their lean years in Birmingham, before they got their new Elan Valley works, and when they were practically measuring their water by gallons, and even by pints. They had recourse to a most strenuous system of inspection for the prevention of waste, and employed a large staff, and spent a great deal of money—as much as £2000 a year—on inspection for waste; and during the time that water was really more valuable to them than money, it paid exceedingly well. His own eyes, and the eyes of others who had to do with the water administration in Birmingham, were opened widely to the fact of the enormous waste that was going on, and generally undetected waste, through faulty fittings. Thereby was impressed upon him the value of this movement of raising the standard of the plumbing trade, by creating a concensus of opinion in favour of well-made and

well-fitted appliances. There was a still wider interest, of course—that of public health, to which no citizen could be indifferent. When it came in their way along the lines of their ordinary work, when they could advance at the same time the very important movement in the direction of public health, and when it also affected their own selfish interests, it seemed to him they were called upon to do what they could to advance the movement. Now what could they do as water engineers and administrators to advance this movement of the registration of plumbers with the view of raising the standard of plumbing work, and making it worth a man's while to become a registered plumber? They could do this to a very large extent. Many of them, according to the powers they had (which varied considerably in different districts) issued lists of authorized plumbers. Whether they were issued merely by way of advice to the public, or whether they had behind them local power, was a question they might set aside for the present. They were issued; and, under whatever authority or sanction, they did a certain amount of good. They exercised a considerable influence upon the public in calling in men to do their work. He thought they could, through these lists, and otherwise by influencing the directions in which work was sent, make it worth while to become a registered plumber. What they wanted to ensure on the part of the registration body was this, that the letters "R. P." should be a *bonâ fide* voucher for efficiency, and as far as possible for honest work. Perhaps the latter was even more difficult to secure than the former; but he thought they could do this: Where a man had secured the right to use the letters "R. P.," it was for them to see that he used the sanction in a worthy manner; and a person who, under cover of these letters, nevertheless did scamp work, and in other ways acted in a manner unworthy of his qualification, could be called to book by the means provided in the new body. It was in this direction, among others, that they as water authorities could be of use. Undoubtedly, during the last few years—during the years of what might be called the "open door" in connection with the movement as formerly organized—a considerable number of persons got admitted to the list, and used the letters "R. P.," who would not now be admitted. The plumbers must now live up to the qualifications that they asked for, or there must not only be a door in, but a door out. And the door out should be open just as widely as the door in used to be open. Their friends who were mainly responsible for the conduct of this movement must ensure that there should be to a certain extent a purgation of the lists; so that they would keep in, as far as possible, only thoroughly qualified and honest workmen and honest masters; and those who were not so qualified, or who did not act up to their qualifications, should be carefully eliminated from the movement. They had in their friend, Mr. Devonshire, one who would certainly watch over the interests of the movement well, and at the same time have in his mind the particular interests of the water undertakers of the country. Having Mr. Griffith, their Secretary, likewise Secretary of the movement, he thought that they might approach the matter with greater confidence than they had ever done, or could feel themselves at liberty to do. Personally, he felt that, in this movement, they had the means of doing real good to the water undertakings of the country in the broad sense—in the sense of economy, in the sense of efficiency; and, at the same time, they could help forward a movement which had in it the elements that would tend very strongly to the promotion of public health.

Mr. H. Ashton Hill (South Staffordshire Water-Works Company) said this was a big subject. He desired to do what he could in the way of promoting better plumbing and the various objects that had been outlined by the previous speakers. At the same time, it was known that water engineers had differences of opinion. They heard of such differences among medical men; but he did not want to say anything that would interfere with the progress of the movement. He would, however, like the members, as an Association, just to take stock of where they were, and of how far they were really interested in this movement in proportion to the other constituent bodies. First and foremost, it was said that this had to do with the public health. Water engineers were not a body, and the officials of water undertakings were not the officers, who were responsible for the public health. Gentlemen occupying the position of their President were those whose duty it was to make bye-laws, and see that all water-fittings and drains, and everything else that was done, had been carried out with due regard to the public health. He thought they should recognize this; and while it was gratifying to know that they were duly represented in this movement, he thought they ought to leave it at that, and be careful that they did not try to do too much. As to bad fittings causing waste, they had had many papers on the subject, and they would probably have many more. But their Leicester member had been able to accomplish all that, if not more than, was sought to be accomplished by this movement; and he would no doubt be able to tell them that he did not require all this energy and steam so far as he was concerned. Mr. Griffith had done it all; and very likely he would say that what he had done they could all do. Some of them had. However, these were one or two practical points that occurred to him (Mr. Hill). As to water engineers entering into plumbing at all, they could only do it as an inspecting body. The master builders who were on the General Committee would no doubt ask the Committee to limit the action of the water engineers in employing plumbers. His own feeling in the matter was that it was better to leave the plumbing alone, and to let the plumbers have it. Representations had been made to him by the Operative Plumbers of Great Britain. A deputation came to see him; and he had been interviewed by various Master Plumbers' Associations. He told them he quite agreed with their views; and, in accordance therewith, he had limited and reduced almost to nothing the private plumbing which his Company used to do. So that, after all was said and done, their interests as an Association were limited. He should like to know who were the members of the Committee.

Mr. Lees remarked that perhaps inadvertently he had conveyed the idea, in speaking of employing plumbers—meaning operative plumbers—by the Birmingham Water Department, that they had working plumbers on the staff. He did not mean that. They had not a single working plumber on the staff. All he meant was the plumbers whom they called in to do work—that was to say, street work and things of that kind, and plumbers whom they recommended or brought in to introduce to those who wished to employ them.

Mr. Hill: I was not referring to your department.

Mr. Lees: I knew you were not; but I thought others might think so.

Mr. Frederick Griffith (Leicester) said he thought that at the very foundation of this question was the contention that practical engineers ought to have the control of their own departments as water engineers, who understood a good plumbing job when they saw it. The question of the registration of plumbers was brought before the Corporation of Leicester some twenty years ago by a deputation from the London Plumbers' Company. A Local Committee was formed; and the Medical Officer of Health was appointed Chairman. The Committee was under the guidance of the London Plumbers' Company; Mr. Coles being the Secretary. It was for the purpose of obtaining the placing of the master plumbers of Leicester on the register of the Plumbers' Company, and to encourage the registration of the general plumbers. Leicester to-day recognized the certificate of the London Plumbers' Company as a basis of qualification, as well as the indenture of the plumber, when applying to be placed on the list of authorized plumbers. They had in Leicester a list of over 120 master plumbers; and no person applying to have his name placed on the list would be considered unless he had qualifications showing that he was a tradesman, and was recognized by the trade as having served an apprenticeship. If he had not his indenture of apprenticeship, or could not produce it (as was the case in some instances), they accepted, in lieu of it, a certificate of the Plumbers' Company of London, so far as the qualifications of the authorized plumber and the operative plumber were concerned. But he was afraid there had been a certain amount of confusion introduced. They had got these Associations running so close together that they were becoming dovetailed into one another; and the result was they could not, in one resolution or one speech, analyze the whole of them properly. They spoke of the registered plumbers under the Worshipful Company of Plumbers, who were an ancient Company holding a Charter, and were the proper body to guide the plumbing trade. But water engineers were a body of gentlemen placed in position as qualified engineers to promote the water industries of the country; and they had made water-works plumbers, who were not known when the Worshipful Company of Plumbers obtained their Charter. The water-works plumbing business was one

that had grown up with water undertakings; and it should be recognized that by necessity water-works had made water-works' plumbers, and not that the Worshipful Company of Plumbers had made them. This matter was one that affected a considerable number of interests; and it was one that could be very well worked by each trade or body respecting its own bye-laws. It should, however, be worked independently of the Association of Water Engineers. They had the employment and the supervision of these plumbers; and they did not want the Association to be too closely allied to the Worshipful Company of Plumbers, who, as an independent body, should work on their own lines apart from the Association of Water Engineers—the same as the Medical Officers, the Sanitary Institute, and others. He thought this would be very much better. In reference to the waste of water, he might say that, with a population of 270,000 persons, the total consumption in Leicester was $16\frac{3}{4}$ gallons per head per day for everything. Measured by meter, $5\frac{3}{4}$ gallons of water were used per day for trade purposes, which made the total domestic consumption only 11 gallons. They had achieved this small consumption by good fittings, by constant inspection for waste, and by stopping waste. They had a staff of 20 waste inspectors, who were trained for detecting waste above and under ground. These officials reported to the office, who gave the opportunity to the authorized plumbers to do the repairs. By this means, waste was detected and stopped; and the consumption per head was reduced without the aid of any waste-detection meter. However, they had established this list of authorized plumbers so as to put the plumbing trade out to the master plumbers within the limits of supply. The master plumbers were the authorized plumbers. They did not authorize the journeyman plumbers. The master plumbers were held responsible for the work of the plumber; and he held his workman or apprentice responsible to him. The Water Department only kept about three or four plumbers for the purpose of following up notices which they were bound to issue if a consumer neglected to stop waste, after receiving proper notice to repair. The department were obliged to enter and repair in a case of necessity. But they had no desire to do plumbing work, or to employ a large staff of plumbers. It was not at all their wish. They would rather depute it to a well-known qualified plumber. Other corporations employed several plumbers—such as Sheffield, where it was said that the Corporation employed forty, and carried on a considerable amount of plumbing work, and thereby competed with the local plumbing trade. But at Leicester, they had found it better to put the work out to the master plumbers of the town. Leicester was a water-closeted town. The number of houses was over 60,000; and the water-closets numbered about 59,000. He pointed this out to show that their conditions were comparable with any other towns. It was the heart of an industrial centre, with a working-class population. It was a well-known fact that these people used as much water as many occupying large residences. With all this, their consumption per head was small.

Mr. Dixon asked whether Leicester had a special clause in their Acts which allowed them to make this list of authorized plumbers.

Mr. Griffith replied that there was a clause in their Acts which gave them power to make bye-laws and regulations. They worked under the clause, the terms of which were similar to clauses possessed by several other towns.

Mr. Dixon further inquired whether the Local Government Board would sanction this? He had been through it; and they would not sanction a clause to make a list of authorized plumbers. He did not think such powers could be obtained, unless by special powers secured under an Act of Parliament.

Mr. Griffith said he thought Leicester had a special clause. He was speaking from memory. A copy of his regulations were in the Association library; and, by the way, he had registered the Leicester regulations with a view of preventing them being copied.

Mr. Easton Devonshire (London) said this matter had been put before the members exceedingly well by Mr. Griffith. The value to the new movement of Mr. Griffith's appointment as Secretary was very great indeed. If it had not been for his appointment, he (Mr. Devonshire) felt he should not have ventured to accept the chairmanship of the Managing Committee. If he might be allowed to do so, he would go back a little—to the last eighteen months. The Association appointed him their delegate to attend the first meeting of the new General Council for the National Registration of Plumbers. He went to the meeting, knowing little, or very little indeed, about the plumbing and the registration movement; and he was considerably prejudiced against the manner in which he noticed it was being carried on. He took the view of the water-works engineers, and took it as strongly almost as any speaker had done that morning. He was almost immediately brought into contact with the operative plumber representative on the General Council, and he found at once that the operative plumber, at all events, was exceedingly anxious for registration. He (Mr. Devonshire) thought it would be worth while reading four resolutions that were passed at a meeting of the Executive Council of the Operative Plumbers' Association (which really represented the whole country), at a meeting held at Manchester on July 15, 1905. A resolution passed by the Congress of Municipal Authorities held in Glasgow the previous year had been considered by the Executive Council of the Operative Plumbers' Association; and their opinion was that the conditions he was about to quote were essential to the object aimed at by the authorities. These were, he thought, of enormous importance to water engineers, and, generally speaking, to the whole country, as showing that the Operative Plumbers' Association were intellectually quite in advance of any other Trade Union at the present time existing. It was the general impression that the object of most Trade Unions was to get the greatest amount of pay for the least quantity of work, and to spread the work over the greatest number of men, no matter how it was done. But the Council of the Operative Plumbers' Association passed these resolutions:

(1) **The principle of apprenticeship for plumbers combined with sound technical education should be systematically advocated and adopted in connection with the National Registration of Plumbers.**

(2) **The education authorities of the kingdom should recognize the value of this principle as necessary to sound industrial training, and should provide facilities for the further extension of plumbing classes in all centres where the plumbers of the locality are prepared to co-operate with the authorities in securing the attendance of a sufficient number of student plumbers working at the trade, and dealing with other practical questions to ensure successful working of the classes.**

(3) **The Board of Education should duly recognize these classes for the purpose of grants made by the Board; and the Board should further recognize, in connection with these classes, such examinations as may be prescribed by the central body for the National Registration of Plumbers, and approved by the Board.**

(4) **The local health and water authorities, and architects, should co-operate, as far as possible, with the local plumbers in furthering the work of the District Councils for the National Registration of Plumbers, especially in setting up and maintaining a sound standard of work executed by plumbers.**

This, he thought, was a very remarkable pronouncement from this exceedingly powerful body. Noticing this pronouncement was made in 1905, he (Mr. Devonshire) asked the representative on the General Council how it was the registration movement seemed to hang fire. What was the difficulty? The operative (who was an important person in this question) replied that their difficulty was this: They advocated efficient work, apprenticeship, and examination, and eventually the registration of their members. "When," he added, "we have done all this in order to accomplish it, and have paid our fees, we find ourselves at a standstill—we find ourselves at work in front of a closed door. The door is the door of the public bodies, and to a great extent of the water authority." "It is quite clear," he also said, "if we are to have any value for our money and our work, and for being better qualified than our fellows, those who employ plumbers should recognize our superiority, and give us preference." He (Mr. Devonshire) said: "Well, how is it that up to the present you are not given preference? Surely it is to the interest of the water engineer and the public health authorities in general that such preference should be given." Now, as water engineers, they all wanted the best work in their own selfish interests, independent of any question of the general good; and for this alone he, being interested in several water companies, was most anxious and determined to have as far as possible the man who had qualifications, of which the holding of a recognized certificate of registration was *primâ facie* evidence. In looking further into the matter, and in attending the meetings of the General Council, he found, in spite of the fact that considerable sums of money had been spent in promoting this movement in the last twenty years, that (for reasons into which he would not now enter) there was a feeling, in the minds of water engineers in particular, that this was an

autocratic movement started by an ancient guild in London, to endeavour to dictate to engineers and the public what they should do. He found that the view was a wrong one. Their attitude was really this in approaching water authorities and engineers: "We have done all we can to give you good workmen; give them preference over bad workmen." When he found, however, as was the case at the end of last year, that the Managing Committee of this movement consisted of such elements as to give a large preponderance of representation to the trade, and when some of the members of the trade on the Committee said, "This is a trade movement, and we must manage it," he at once replied, "You can do through your Trade Unions all that you desire for the protection of the trade; but if you invite representation in this movement from the Association of Water Engineers and from other important bodies, the understanding must be one of equal partnership. We shall not help you in anything that is merely a trade movement as apart from the interests of public health and advantage." He took this standpoint from the first, in the interests of the dignity of the Association; and he gave them to understand that he should absolutely refuse to continue, or to let, so far as he was able, any representation continue, on their Council until an entire change was made in the position of the Managing Committee. The constitution of the Committee was now known to those whom he was addressing; and he need not go into it except to say that there were five nominations to the Managing Committee which were made by five important public bodies, of whom the Association was one. That was a strong point, and one that was likely to secure, and secure for all time, at all events, a more reasonable representation of the interests of the public in this registration movement than had been recognized up to now. The new recognition was the partnership between the plumber and the public to secure better work. But for some time they would not be able to do much, because there was the question awaiting attention, of reviving in some districts the local councils, which had been allowed to drift almost into nothingness. In connection with these local councils and local work generally, he might say at once that all water authorities had not, as was the case at Leicester and in one of his own companies, powers to make bye-laws without reference to the Local Government Board. But where they had powers, they were to an extent independent of the work of the General Council; being able to make their own lists of authorized plumbers. They put the names of those whom they chose on the lists, when their qualifications were such as to satisfy them; and they were the best judges of these qualifications. But the undertakings that had such powers were very rare, and were becoming proportionately less every day. As one speaker had said was the general case, they had to go to the Local Government Board to sanction their regulations, and they knew the limit put upon these regulations. In no case had they been able to absolutely satisfy the Board as to the value of an authorized list comprising solely the names of persons of whose qualifications they were assured. Were they not dependent on the standard of qualification that could be guaranteed by such plumbers as they could recommend to the public? and were they not obliged, if they published a list, to put upon it the names of many others who offered no such guarantee? There were many who, although they recognized them as good workmen, had not thought it worth while to have such a certificate. He had now a practical suggestion to make to water authorities who had not the powers of Leicester and a few others. He suggested that they should all publish their authorized lists regularly; and that they should put against the names of those who had a certificate, the letters "R. P.," including in the authorized lists all who were believed to work satisfactorily. Put this before the public, and say to them that though the list was not necessarily recommended, it was the authorized list. A list of plumbers might even be compiled from the local directory, and against the names of the certified men could be placed the letters "R. P.," with a footnote saying that the "R. P." showed that the plumber entitled to use this affix had got a certificate, and had passed his qualification examination. Those who had not the right to put the letters "R. P." after their names would soon try to obtain the right. The Managing Committee would absolutely maintain the standard of examination. Unfortunately in the past, a good many men were let in without going through the mill of examination as defined by the rules. The examination, however, was now carried on locally by one or two men appointed by the Local Council—one being a master, and another an operative plumber, to whom were added two further examiners nominated by the Board of Examiners who sit in London. In the past, there had been in occasional instances a relaxation in the conditions of examination; but he thought they might all feel security that the "R.P." certificate would in future be strong *primâ facie* evidence of the holders' qualifications. There was a point upon which Mr. Lees had touched. He thoroughly agreed there were men who had passed examinations and had got the certificate, but who had been let in by the back door; and there were men who had been good men but who were no longer so. The movement provided for dealing with such cases as these; and then the Council required the help of the local men in authority—the water engineer especially—to tell them what a fellow plumber would hesitate to say, whether a man who had been a good man had fallen away, and was so no longer. To a great extent, they would have to depend for such information upon those having local authority. They might actually ask for, and obtain, from local authorities in touch with the General Council their authorized lists; and if they found in certain cases that a man's name had been dropped out, the Council would ask why this had been done. If they found dishonest work had been done by him, they would call upon the Plumbers Company, who were the registering body, to act upon the powers they undertook to use, and strike that particular man's name off the register. These precautions were absolutely necessary, in order that water engineers might attach value to the certificate. It was clear they must recognize only one certificate. They could not have two or three. There had been proposals by a small body of masters to grant a certificate of their own. But a certificate granted to the trade by the trade was no good to water authorities. There was this value in having a registering body quite independent of the nominating body and examining body. They had a mutual control one of the other. Supposing, in order to increase the number of members, the Managing Committee relaxed the conditions of examination, the Plumbers Company, as the registering body, could say, "You have not fulfilled the requirements or the intentions for which you were elected." On the other hand, if they left the registration in the hands of the Plumbers Company as it had been, they being also the examining body, pressure might be brought to bear on them in certain instances to relax the conditions of examination. In conclusion, he (Mr. Devonshire) might say that he had stuck to this work as the representative of the Association, on the conditions he had mentioned. He should not have stayed in if they had not been able to reconstitute the Managing Committee on the lines it was on now. If all would carefully consider the new position of affairs without bias or antipathy, it would be seen that it was in the interests of the water engineers to do all they could to help forward this movement; and where there were Local Councils, the water engineer should help, even if he did not take the initiative in creating Local Councils.

Mr. A. B. Simpson (London) said that water engineers ought to control all these matters; and they must take care that the plumbers did not dictate to them. He was at the present time President of the Institute of Heating and Ventilating Engineers; and there was now considerable trouble between the operative plumbers and the interests he represented. He did say, and quite agreed with what Mr. Frederick Griffith had said, that they, as water engineers, were quite able to manage their own affairs, and that they were able to lay down specifications, prepare standards of fittings, and see that the plumber did his work as a plumber, and that he was not given a monopoly to dictate to everybody else outside the plumbing trade. The Association of Water Engineers should, in his (Mr. Simpson's) opinion, be very careful to maintain a neutral position in this matter, and not grant any monopoly to the plumbers. As water engineers, they knew of several Bills that had been before Parliament, introduced by the plumbing interests, which, if they had become law, would have given the plumbers a monopoly. They lived in a country where they all liked fair play. There were to-day old-established businesses in this country which were having a bitter fight against the operative plumber, simply because he claimed more than he had any right to—a right to run all pipes irrespective of what metal they were made of. He repeated that, in his opinion, great care must be taken to see that no monopoly was granted to any one interest.

The President (Mr. H. E. Stilgoe) said the members

were much indebted to Mr. Devonshire for giving them the explanations he had done. Perhaps he (the President) ought to exactly explain the circumstances under which this subject was introduced to their notice that day. Mr. Percy Griffith was the Secretary of the General Council for the National Registration of Plumbers. In that capacity, he had introduced the subject to the meeting, as any person might read an ordinary paper. Mr. Easton Devonshire was the Chairman of the Managing Committee of the General Council. Knowing that he held this position, the Council of the Association of Water Engineers had appointed him as their delegate, because no person was in a better position to keep the Association informed of what was going forward than the Chairman of the Managing Committee of the General Council. He (the President) wished to mention this matter in these few plain words, so that the members might know exactly where the Association were in this movement. They were kept up to date with information as to what was taking place; and that was the sole object of introducing the question to the Association that day. What they had to do was to see that the interests of water engineers were fully safeguarded. This summed up the position; and, as an Association, they were greatly indebted to Mr. Percy Griffith for introducing the subject, as well as to Mr. Devonshire for his explanation.

Mr. W. O. Thorpe (Malvern) said he presumed, if this matter was going forward, they must have perfect unanimity among all bodies concerned. Most important of all who were interested in this matter were those who were connected with the sanitary aspects of the public health. Had the Royal Sanitary Institute been consulted in any way as to how they viewed this scheme? No one was more concerned in the work of the plumber than the sanitary inspector.

The President replied that he was unable to tell Mr. Thorpe whether the body he mentioned had been consulted. He quite agreed that for the success of everything they must all be united; but just at the moment they were only viewing this matter from the standpoint of the water-works engineer. Other Associations interested in like manner would take care that they were properly represented, and so be kept up to date with information.

Mr. Thorpe said if they as an Association were so desirous of having this scheme carried out, they ought to make sure that no other body would be in a position to throw it out at the eleventh hour, when everything was apparently settled.

This ended the discussion.

SULPHUR COMPOUNDS IN COAL GAS.

Chemical Tests upon Edinburgh Gas.

At a Meeting of the North British Branch of the Pharmaceutical Society of Great Britain, held in Edinburgh last Wednesday—Mr. J. P. Gilmour, the Chairman of the Executive, presiding—a paper by Mr. D. B. Dott, Ph.C., F.I.C., and Mr. J. Wilson Dougal, B.Sc., on "Sulphur Compounds in Coal Gas," was read.

The authors, in the course of their paper, said it had been matter of former observation that copper vessels were more corroded by the use of burning gas than was at one time the case. They had little doubt that this change had arisen from the employment of coal containing a larger percentage of sulphur than was formerly in use. As previously noted, the corroded coating consisted largely of sulphate. The subject was recently brought under their notice in another way. A leather covered chair which stood near a fair-sized gas-stove became damaged on the surface. On examination, the leather gave a strong acid reaction, and the washings from it gave an abundant precipitate with barium chloride. Of course, it might be said that the acid might have another origin than the burning gas; but this theory was rather negatived by the fact that coverings of the same kind in another room had not suffered. The leather was tannin-tanned, not chrome. In any case, it became interesting to test the gas as now supplied. It was first passed over subacetate of lead paper; but no sulphide reaction was obtained. On the other hand, the gas readily reddened moist litmus paper, and decolorized iodized starch solution. Weak soda solution tinted with phenolphthalein was rapidly decolourized by a current of the gas. These reactions rather indicated sulphurous acid, though not in themselves conclusive.

The question of the compounds formed in the destructive distillation of coal was very complex, and no doubt the complete removal of all the deleterious compounds was beset with difficulties. They could only demand that these compounds should be removed as completely as practicable. The point to which they had given particular attention was the practical one of the amount of sulphuric acid which was formed when the gas was burned. They consumed the gas in an ordinary bunsen placed under a bell glass, connected with a glass condenser and closed receiver—air being continuously aspirated through. The gas was measured by a new, clean, wet meter. On one occasion, they obtained 0·2 gramme of sulphuric acid from 130 cubic feet. Taking the consumption of gas in one year at 2,075,828,000 cubic feet, this would represent fully three tons of sulphuric acid produced by burning the gas of the Gas Commission in a year. If they added to this the large amount of sulphuric acid sent into the air by burning coal, the atmosphere of the city and neighbourhood must receive a large supply of this deleterious and corrosive compound. That a proportion, at least, of the sulphur compounds in the coal gas could be kept back, was evident from the fact that a considerable amount of sulphuric acid was found in the water of the meter. It was something in favour of wet meters, whatever might be said against them, that they partially purified the gas. It must be noted that the quality of the gas varied from time to time. Sometimes the washing water gave little indication of sulphate or sulphite; while the burning gas yielded a good deal of sulphuric acid. On examining the water drawn from a wet meter where it had been for some time, there was only a very slight indication of sulphate. But it took up and decolorized a large proportion of iodine, and gave strong reactions for hydrocyanic acid with the prussian blue and ferric sulphocyanide tests. Similarly, when a current of gas was passed through water containing magnesia, and hydrochloric was added, a distinct odour of prussic acid was evolved, and the mixture gave reactions like the water from the meter, though less distinctly.

They had no desire to say anything of an alarmist nature; but it was evidently desirable to keep down the sulphur and other objectionable impurities to a minimum. It might be added that, as a certain proportion of these compounds seemed to be inevitable, it was obviously important that the ventilation should be sufficient where a considerable amount of gas was burned. In the case of a stove consuming over 20 cubic feet of gas per hour, the amount of acid and other impurities produced in the course of a year, if not carried off by a good draught, would be capable of causing an appreciable amount of mischief. As the sulphuric acid formed by burning coal was one of the most destructive agencies on stone buildings, so the acid formed by burning coal gas had a damaging effect on interior furnishings.

Discussion.

Mr. W. Duncan, of the Edinburgh Royal Infirmary Pharmacy School, said he could confirm Mr. Dott in saying that Edinburgh gas contained sulphur of some sort. He had repeatedly observed that the copper fittings of incandescent burners became coated with copper sulphate; and as it accumulated, it seemed to work its way on to the mantle and destroyed its luminosity. He had scraped the crust off the mantle fittings and found any amount of sulphate radicle in it. At any rate, his impression was that sulphate was present.

Mr. W. Cowie, of the Edinburgh Central School of Pharmacy, corroborated what Mr. Duncan had said, in another way. During the last few months he had noted a very heavy corrosion on an air-bath which was in use only intermittently, whereas on the water-bath which was in continuous use there was very little corrosion. On the air-bath the deposit was very heavy and white, not only on the base, but also on the sides. Some time ago there was a note on this subject in the "Scotsman," which led them to examine the deposit, and they got a reaction for sulphite very distinctly. The matter ought to be brought before the authorities with the view of having it removed.

Mr. Dryerre, of Bonnyrigg, said they were troubled with these sulphur compounds in his district, and he would like Mr. Dott to say what he considered was the maximum amount of sulphur allowable in a fairly good quality of gas.

Mr. W. S. Glass, of Edinburgh, said he could bear testimony to the presence of sulphur in the gas they were using. It was very difficult to keep metal free from it. He had not tested it; but he saw that anything of a copper nature very soon showed that some strong acid was acting upon it. He wished to know if sulphuric acid had an injurious effect upon health. A number of years ago, an apprentice of his thought that he had invented a great cure for whooping cough, and persuaded his friends that if they tried burning sulphur, they would soon cure themselves; and he believed he effected cures in this way. They were entitled in Edinburgh to get fairly good gas for illuminating purposes, and means should certainly, in his opinion, be taken to overcome the presence of sulphur.

Mr. C. H. Hendry, of Edinburgh, thought there was no doubt whatever that Edinburgh gas had deteriorated within the last two or three years. They knew the effect which burning gas had on the paper and interior fittings of a house; and this was due to the sulphuric acid in the coal. Their gas was supplied fairly cheap—more moderate than in most towns; but if it generated deleterious substances in the atmosphere, and caused ill-health to the community, they might consider whether they were not paying very dear for it after all.

Mr. J. Rutherford Hill, of Edinburgh, said the remark about whooping cough reminded him of a man who was attacked with lung disease and lost one lung. He was recommended to change

his calling, and to go into a gas-works. He did so, and ultimately rose to be manager of the works. He kept the position for many years, and became perfectly healthy. But he questioned very much whether the presence of sulphuric acid in a room was conducive to health, in the case of an ordinary individual. They knew that it was injurious to health; and it was imperative, if it were only practicable, to reduce the sulphurous acid in the air. Sulphurous acid might be bad enough, but sulphuric acid was a great deal worse; and he took it that it was sulphuric acid they got when they burned gas. Mr. Dott's paper was very interesting, and perhaps suggested methods of purification at the gas-works which would be sufficient to take out sulphur. Ferric oxide would remove sulphur of the ordinary kind, in the form of sulphurous acid or hydrogen sulphide; but he greatly doubted whether it would remove carbon bisulphite, or any hydrocarbon containing sulphur. He raised the question of whether the use of incandescent flames was not more likely to produce a larger proportion of sulphuric acid by the more complete combustion of the gas, and whether the sulphur compounds were not incident to the use of the mantles. Good ventilation was an important matter. They went back largely to gas because of the fine illumination to be obtained with the mantle, as compared with the electric light; but he was not sure whether people realized that the mantles were contaminating the atmosphere of their rooms, and that therefore more ventilation was necessary than with electric light.

The CHAIRMAN said he had examined the gas they had in Glasgow, and found that it did not contain any sulphuretted hydrogen. The manufacturers of gas might have very great difficulty in removing some of these compounds; but it was desirable that an effort should be made to remove them. The blackening upon mantles could be burned off.

Mr. DUNCAN said they could not do this with Edinburgh gas.

Mr. DOTT said he must leave it to an expert to say what was the allowable maximum of sulphur compounds in gas; but, presumably, it should be the lowest possible. The most effective way of reducing the sulphur was by passing all the gas through calcium sulphide.

HIGH-PRESSURE INVERTED GAS LIGHTING IN FLEET STREET.

Considerable progress has been made with the work of the new installation of inverted gas lighting since attention was last drawn to it in the "JOURNAL;" the work having proceeded by day and night and on each Sunday. The high-pressure main from Ludgate Circus to St. Clement Danes' Church in the Strand was laid and tested in two weeks; the cross services through the roadway and pavements being put in on the succeeding Sundays, and the ¾-inch services up the house fronts and the ½-inch supply over the facias to the foot of the brackets being fixed at night and on Sunday, owing to the traffic requirements and to the quietness needed for the banking and newspaper offices. Several important alterations and slight additions have been made since our last reference to this work. The "swan-neck" brackets, of which an illustration was given on the 1st inst. (p. 613), have been abandoned, as when a trial fixing was made, they were found not to be sufficient in projection (4 ft. 6 in.) from the house fronts; and a square bracket, much bolder, larger, and more ornate, with the City Arms in the centre of the scroll-work, and having a projection over the public way of 6 feet, substituted, as shown in the sketch last week, p. 757. Seeing that the bracket will be fixed 20 feet above the footway, and the height of the mantle is 16 feet from the path, this is not considered too great a projection to cause the rays of light to meet on the diagonal line.

The idea of utilizing the existing columns on the rests in the roadway by lengthening and adapting them has been dropped, and new City pattern columns of the required height, similar in design to those in Queen Victoria Street, have been decided upon. An addition has also been made to the number of lamps by running a small main partly down Chancery Lane, and fixing a similar lamp in that thoroughfare.

Then in the matter of tee-ing the main at the side streets, with the view of tapping it for industrial purposes, as has been foreshadowed, applications have already caused the laying of a steel tube main down Bouverie Street; thus giving a day and night load to the main. This will alter the system of lighting and extinguishing the lamps automatically at sunset and sunrise by pressure from the central power station. The lamps will now be all fitted with bye-passes and the lamps lighted and extinguished individually.

A start was made with the fixing of the new brackets yesterday morning; and, by working day and night, the installation will be completed and Fleet Street will be illuminated on Christmas Eve, as promised.

Sir Alfred de Bock Porter, a member of the Water Commission of 1897, whose death was announced in the "JOURNAL" for the 1st inst., left £10,532.

The late Mr. Herbert Bennett Green, third son of the late Mr. Henry Green, of Preston, whose death on the 11th of August was recorded in the "JOUNRAL" at the time, left estate valued at £2717 gross; the net personalty being £2592.

EXTRACTION OF CYANIDES FROM COAL GAS.

The System Employed at Birmingham.

Before the Birmingham and Midland Scientific Society last Wednesday, Mr. C. CARRINGTON BARBER, of the Nechells Works of the Birmingham Corporation Gas Department, read a paper on the "Extraction of Cyanides from Coal Gas," of which the following are the main points.

In Germany, the quantity of cyanogen in the coal gas was so large that it was found that it attacked the plates of the gas-holders and the meters and fittings on the premises of the consumers, so that it became a matter of necessity that it should be extracted from the gas before being placed into the holders, apart from any financial benefit that might accrue from so doing. It was therefore in Germany that the first serious considerations regarding the extraction of cyanogen from coal gas were given. Some fifteen or sixteen years ago, however, the attention of English gas engineers was drawn to the methods employed for the recovery of gold; and it was as a result that they gave their serious consideration to the extraction of the cyanogen compounds from the coal gas.

The sources for the recovery of cyanogen from the gas resulting from the destructive distillation of coal are three in number—firstly, from the gas; secondly, from the ammoniacal liquor; and, thirdly, from the spent oxide used in the purification of the coal gas for sulphuretted hydrogen. The various theories advanced as to the formation of the cyanogen compounds are very numerous, but it is sufficient for us to know that the bulk of it is formed from the end of the first hour to the end of the third hour in a six-hour distillation of the coal, and that the quantity produced depends on the speed and temperature of carbonization—the largest yields being when the distillation is quick and the temperatures of the retorts high.

The British Cyanides Company's patents cover the methods for recovering the cyanogen in the gas as sulphocyanide. Their process consists in adding granular sulphur to the ammoniacal liquor in a specially constructed washer. The granular sulphur dissolves and unites with the ammonium sulphide contained in the liquor to form ammonium polysulphide. The polysulphide absorbs the hydrocyanic acid contained in the gas forming ammonium sulphocyanide and ammonium sulphide, liberating carbonic acid gas and water, according to the following equation:—

$$2Am_2S_2 + Am_2CO_3 + 2HCN = 2AmCNS + 2Am_2S + CO_2 + H_2O.$$

It is necessary to ascertain if there is sufficient ammonium polysulphide in the washer from time to time. The reaction showing the formation of the ammonium polysulphide in the washer is as follows:—

$$S + Am_2S + Am_2CO_3 = Am_2S_2 + Am_2CO_3.$$

This method of extraction is a very efficient one; the extraction resulting in about 98 per cent. of the cyanide in the gas.

The first wet process for the extraction of the cyanogen and the cyanogen compounds contained in coal gas was patented by Herr Knublauch, in the year 1892. The late Mr. William Foulis, of Glasgow, patented another system in the year 1892; the method of the latter being that the gas is washed and scrubbed in the usual manner for the extraction of ammonia before the extraction of the cyanogen. Both systems aim at the production of alkaline ferrocyanides. It has been found that when the gas is treated for the extraction of the cyanides after the extraction of the ammonia, an efficiency of from 70 to 80 per cent. only can be obtained. It was also found that if the cyanides were extracted prior to the extraction of the ammonia, an efficiency of nearly 100 per cent. could be secured.

It was as a result of experiments made regarding this that decided the Amsterdam Gas-Works to adopt a modification of the Knublauch system of extraction. The liquor employed there consists of a mixture of ferrous hydrate and ferrous carbonate, with a quantity of potassium carbonate dissolved in it. The gas treated is crude, only the tar having been extracted, and therefore contains, in addition to the cyanogen compounds, sulphuretted hydrogen, carbonic acid, and an excess of ammonia. When the freshly-prepared liquor enters the washer, which it does at the gas-outlet, the gas is practically free from cyanogen, so that the ferrous hydrate is converted into ferrous sulphide, which is very active for the absorption of cyanogen. The method employed at Amsterdam was described by Heer D. Stavorinus in the "JOURNAL" for April 3, 1906 (p. 40). The practical result of the washing action is a black liquor; being a mixture of a clear yellow solution and a blue-black precipitate. The solution contains potassium ferrocyanide, potassium sulphide, the excess of potassium carbonate that has not taken part in the reactions, and different volatile salts.

Rowland's process for the extraction of cyanogen and cyanogen compounds, which was patented in 1892, consists in adding an iron salt to the ammoniacal liquor contained in a scrubber. Ammonium ferrocyanide is formed, which remains in solution in the liquor. After the addition of a salt or oxide of iron, the ammoniacal liquor is distilled, the addition of iron converting the ammonium ferrocyanide into double ferrocyanide of iron and ammonia, which is insoluble. The ferrocyanide of iron and ammonia is separated from the liquor by the addition of milk of lime, and then filtered. The solution is heated to boiling, and potassium sulphate or

chloride of lime is added to it, forming double ferrocyanide of potassium and lime. The double ferrocyanide of potassium and lime is treated with potassium carbonate, which, on ignition, converts it into alkali ferrocyanide and calcium carbonate. The calcium carbonate is separated by decantation, and the weak solution is then concentrated by evaporation, and afterwards allowed to crystallize out.

One more important method which is employed on a large scale on gas-works in this country is that patented by the late Mr. G. E. Davis, which is known as the Davis-Neill process for the extraction of cyanogen compounds from coal gas. The system is as follows: A mixture of sodium carbonate and ferrous sulphide, which is prepared by precipitating ferrous sulphate with ammoniacal liquor, is used for scrubbing the gas prior to the extraction of the ammonia. This mixture, together with the ammonia in the gas, forms sodium ferrocyanide and insoluble ammonium ferrous ferrocyanide. The solution is then passed through a column still. Sodium hydrate is introduced into this still, thus converting the insoluble salt into the soluble sodium ferrocyanide. The ammonia liberated in the still is recovered. The solution containing the sodium ferrocyanide is filter-pressed, and the clear weak solution obtained is evaporated; and the cyanide is purified by recrystallization. The mud obtained from the filter-press is returned to the washer.

Though I have only given a few methods employed for the extraction of cyanogen from coal gas by using the ammonia contained therein and in the ammoniacal liquor, as the alkali, you will gather from what I have said that an exceedingly good efficiency is obtained. The chief difficulty of these processes is in the conversion of the sulphocyanide into cyanide. This is usually done by fusing the sulphocyanide with iron or zinc in a reducing atmosphere, which makes as a bye-product sulphide of iron or zinc.

The Foulis process, to which I have already referred, is employed at the Glasgow Gas-Works. As already explained, the gas is treated for the extraction of the cyanogen compounds after the extraction of the ammonia; and the mixture employed is a solution of alkaline carbonate containing carbonate of iron in suspension. A solution of ferrous chloride is added to a solution of sodium carbonate; carbonate of iron being precipitated. The solution of sodium chloride is decanted, and the carbonate of iron put in suspension in a solution of sodium carbonate. The solution run off from the washer is evaporated to a cake. The cake is then extracted with water, and the alkaline ferrocyanide is obtained from the extract by recrystallization.

The next and last process that I shall describe dealing with the extraction of the cyanogen and cyanogen compounds from the gas is the one employed at the Birmingham Gas-Works; and since I have had considerable experience with it, I will describe it in more detail than the previous processes. The system is very similar to that patented by Mr. Foulis, with the exception that lime is used as the alkali instead of sodium carbonate.

Cream of lime is mixed with ferrous sulphate in a mixer; this causing the precipitation of ferrous hydroxide and calcium sulphate. The mixing is carried on for about a quarter-of-an-hour, after which it is run into a Holmes washer. In the washer, the ferrous hydroxide is converted into sulphide, and the lime into carbonate, due to the gas treated containing, in addition to the cyanogen, sulphuretted hydrogen and carbonic acid. The hydrocyanic acid is then absorbed, forming calcium ferrocyanide; the reactions being as follows:—

$$FeS + 2CaCO_3 + 6HCN = Ca_2Fe(CN)_6 + H_2S + CO_2 + 2H_2O.$$

The solutions are run into the washers at intervals of about four hours; the washers being run off just a short time prior to the running in of the fresh solutions. The mixture run off from the washer is a black sludge, which is filter-pressed. The clear liquor, consisting of calcium ferrocyanide, iron sulphide, and calcium sulphate, is run into precipitating tanks, where the calcium salt is precipitated with sodium carbonate; thus giving sodium ferrocyanide and calcium carbonate according to the following equation:—

$$Ca_2Fe(CN)_6 + 2Na_2CO_3 = Na_4Fe(CN)_6 + 2CaCO_3.$$

The calcium carbonate is allowed to settle to the bottom of the tank, after which the clear solution is run off to storage tanks, whence it is run to the evaporator. On the solution nearly reaching the boiling-point, iron sulphide is thrown down; and this has to be extracted from the concentrated liquor by means of a filter-press or settling-tank before clean crystals of sodium ferrocyanide can be obtained.

After describing the Holmes scrubber-washer (which is the type of washer now employed at the Windsor Street Gas-Works of the Birmingham Corporation), and the evaporator made by Messrs. P. Kestner and Co., of Lille, the author proceeded to deal with a few processes for securing the cyanogen contained in the ammoniacal liquor; remarking that the liquor contains a certain amount of cyanide in the form of ferrocyanide and ammonium sulphocyanide.

When ammoniacal liquor was first treated for the extraction of its cyanogen contents, the liquor was distilled in the usual way, in the presence of lime, in order to recover the ammonia. To the clear solution, equal amounts of copper sulphate and copperas (ferrous sulphate) were added. This precipitates copper sulphocyanide as a fine quickly-settling powder, which is easily separated by means of a filter-press. The copper sulphocyanide is then decomposed by means of ammonium sulphide; copper sulphide being precipitated and ammonium sulphocyanide formed. The copper sulphide is reconverted to copper vitriol by roasting, and is used again for precipitating a fresh quantity of ammoniacal liquor. The ammonium sulphocyanide is obtained pure by filtration and evaporation.

Another process—viz., Pendrie's—aims at recovering the cyanogen compounds in the ammoniacal liquor as prussian blue. The ammoniacal liquor is distilled in the usual way; the residue being allowed to stand until it becomes clear, as in the previous method described. The liquor is then filtered, and sulphuric acid is added in order to remove any sulphuretted hydrogen that might have been retained in the liquor after the distillation for ammonia. A portion of the sulphuretted hydrogen is set free, while another portion of it is decomposed. The solution is then filtered, in order to extract the sulphur and calcium sulphide. A suitable quantity of a ferric salt is added to the clear solution; prussian blue being precipitated. This is converted into sodium or potassium ferrocyanide, after filtering and allowing the prussian blue to stand in contact for several days with a lye made of caustic potash or soda.

The Lewis process for extracting the cyanogen compounds from the ammoniacal liquor is similar to Pendrie's in many respects. The residual liquor, after having distilled the ammoniacal liquor for the recovery of the ammonia, contains the ferrocyanide and sulphocyanide in the form of calcium salts. The liquor flows from the stills to a large tank, from which it is pumped to the top of a tower, which is filled with coke or brushwood, through which it filters. During the passage of the liquor through the tower, it comes into contact with a current of sulphurous acid and carbonic acid flowing in opposite directions. The sulphurous acid and carbonic acid are obtained by passing the waste gases from the ammonia-stills over a grate, when the sulphuretted hydrogen is converted into sulphurous acid. The liquor passing through the tower is thus neutralized and acidified. On the now acid solution leaving the tower, it flows into a long reservoir, where a solution containing ferrous and ferric salts is added to it; thus precipitating the ferrocyanides as prussian blue. The liquor is then filter-pressed, and the clear solution is treated for the recovery of the sulphocyanides. Copper sulphate is added to this liquor, forming an insoluble white precipitate of cuprous sulphocyanide:—

$$Ca(CNS)_2 + H_2SO_3 + 2CuSO_4 + H_2O = Cu_2(CNS)_2 + CaSO_4 + 2H_2SO_4.$$

The copper sulphocyanide is separated by filtration, and is washed. It is then treated with a solution of alkali sulphydrate, as previously described, thus forming alkali sulphocyanide and insoluble copper sulphide. The alkali hydrosulphate is obtained by passing the waste gases from the ammonia stills through a washer containing a strong caustic alkaline solution.

Having dealt with the extraction of the cyanogen compounds from the coal gas and the ammoniacal liquor, I am left with the third source of recovery—viz., from spent oxide, which is obtained by the purification of the coal gas for sulphuretted hydrogen by means of iron oxide. In addition to the sulphuretted hydrogen that is extracted, the oxide also absorbs cyanogen, which it retains in the form of ferrocyanides, and ammonium sulphocyanide and sulphate. It was in England that the first attempts were made to extract the sulphocyanide from the spent oxide; and this was due to the increased demand for this salt, owing to its employment in dyeing and calico printing. The quantity of sulphocyanide contained in various samples of spent oxide varies considerably, and only such as are fairly rich in sulphocyanides are worked up.

The oxide is directly extracted with water in an apparatus constructed similarly to that used in the lixiviation of black ash, which is known as Buff and Dunlop's or Shanke's apparatus. The plant consists of a number of wooden tanks, so arranged that the liquor that has been used for the final washings of the spent oxide is employed for the first extraction from the fresh spent oxide. The liquor obtained is not very strong, and rarely contains more than 2 per cent. of ammonium sulphocyanide. Besides ammonium sulphocyanide, the liquor also contains varying quantities of ammonium sulphate and ferrous sulphate. A solution of copper vitriol containing sulphurous acid is then added for precipitating the ammonium sulphocyanide as copper sulphocyanide, as previously explained; and the copper sulphocyanide is treated with ammonium sulphide, thus forming ammonium sulphocyanide and precipitating copper sulphide. Another method of working the liquor up, is to evaporate the liquor obtained after washing the spent oxide, so far that the ammonium sulphate separates out. The mother liquor is then boiled with baryta. The solution of barium sulphocyanide thus formed contains a slight excess of baryta, which is removed by passing carbonic acid through the liquid until it has a neutral reaction. The liquor is then filter-pressed and evaporated. There is a little more trouble experienced by employing this method; but since the barium sulphocyanide is preferred to the other salts for dyeing purposes, and therefore commands a higher price, it is amply repaid.

The next important process for the recovery of ferrocyanides from spent oxide is that of Kunheim and Zimmerman. In this the sulphur is first of all extracted from the spent oxide by means of carbon bisulphide or light petroleum ether. After the removal of the sulphur, the spent oxide is extracted with water as in the previous methods described to recover the sulphocyanides. The oxide is then allowed to dry in the air, after which it is thoroughly mixed with powdered lime, and heated in a closed vessel to a

temperature of from 400° to 10° C., in order to drive off all the ammonia present in the form of insoluble compounds. The resulting mass is then systematically extracted. The calcium ferrocyanide solution obtained, which still contains ammonia, is neutralized and boiled. Thus the soluble double ferrocyanide of calcium and ammonia is precipitated. This salt is boiled with a solution of milk of lime, which forms a pure solution of calcium ferrocyanide. The calcium ferrocyanide is then converted into prussian blue by the addition of an iron salt. To obtain potassium ferro cyanide (prussiate of potash) from this the solution is partially evaporated, and a sufficient quantity of potassium chloride is added to the solution to form the difficultly soluble potassium calcium ferrocyanide. On boiling this with a solution of potassium carbonate, it is converted into potassium ferrocyanide. The corresponding sodium ferrocyanide may be obtained by substituting sodium carbonate for potassium carbonate.

Another process that combines the working up of the ammoniacal liquor as well as the spent oxide is that of Wolfrum. The spent oxide is extracted with sulphuric or hydrochloric acid. The solution obtained contains considerable quantities of iron, and is neutralized with ferric oxide. The solution is then mixed with ammoniacal liquor. By the treatment with acid, the ammonium sulphocyanide that is contained in the spent oxide is eliminated, while the double compound of ammonium ferrocyanide and prussian blue is converted into ammonium sulphate or chloride and prussian blue free from ammonia, which latter remains in the residue. There is a quantity of sulphur also in the residue; and this is extracted by means of carbon bisulphide or light petroleum ether. The precipitate formed on mixing the iron solution with the ammoniacal liquor contains about 30 per cent. of sulphur and about 40 per cent. of ferric oxide. After the sulphur has been extracted, the residue may be used again for the purification of coal gas for sulphuretted hydrogen. The liquor is then distilled to free it from the ammonia, after which it is returned to the scrubbers. This process is repeated until the liquor contains sufficient ammonium sulphate and sulphocyanide to pay for their recovery by evaporation. The residue from the spent oxide, after extraction with acid and carbon bisulphide, is utilized to prepare potassium or sodium ferrocyanide.

Prussian blue is extracted from spent oxide by milk of lime and by caustic soda. The extraction with milk of lime is not very satisfactory. The spent oxide, after the sulphur has been extracted, is boiled with milk of lime until no more ammonia is evolved, so as to prevent the formation of the double salt of calcium and ammonia, which is not easily extracted. The thick liquid must be treated for hours with steam before the ammonia is all driven off. This makes the milk of lime process almost impossible in practise. Spent oxide which does not contain at least 10 per cent. of prussian blue does not pay for treatment with caustic soda, though the extraction with caustic soda decomposes the prussian blue completely, and the sodium ferrocyanide formed is easily extracted.

Kunheim and Zimmerman's system requires that the sulphur should be absent. To extract the sulphur without at the same time decomposing the ferrocyanides and sulphocyanides is not an easy matter; and it must be done by employing liquids at temperatures under 100° C. Suitable liquids are carbon bisulphide, light petroleum ether, and benzene. The sulphur cannot be driven out by roasting or by superheated steam, since the high temperatures will decompose the cyanide contents, and therefore must be avoided.

At the conclusion of the paper, Mr. Barber was accorded a hearty vote of thanks, on the proposition of Mr. Johnson, seconded by Mr. Cresswell.

"The Last Word in Lighting."

This is the title of a pamphlet, in a pale blue and gold cover, which has been prepared by the Bournemouth Gas and Water Company, with the view of impressing upon those into whose hands it may fall the more important advantages possessed by gas as a lighting agent. The alluring style in which the pamphlet is got up is certain to secure due attention to the contents from those before whom it is placed; while the beautiful coloured illustrations by which it is accompanied will doubtless in very many cases —if not all—ensure the careful preservation of the booklet after due perusal. Cost—as is only fitting in these days of economic considerations—is dealt with first; and on this point it is shown that, with gas at 2s. 9d. per 1000 cubic feet, and electricity at 6d. per unit, the same light can be obtained from gas at less than one-fourth the cost of electricity, even when using Osram lamps. Proof is next adduced (by means of numerous quotations from the sayings and writings of competent authorities) that gas is the healthiest form of lighting, and that it is best for the eyes; while, after a brief reference to its artistic attributes, the advantages of gas for shop illumination are also convincingly enumerated. The facts set forth in the pamphlet are followed by Bournemouth "Consumers' Opinions" (which, in their turn, embrace some very striking facts), based on actual experience of both gas and electricity; and these may be confidently relied upon to appeal to Bournemouth people. Altogether, the Company and their Engineer and General Manager (Mr. Harold W. Woodall) are to be congratulated upon the effective weapon which they have forged in the pamphlet under notice.

SCOTTISH JUNIOR GAS ASSOCIATION.

WESTERN DISTRICT.

The members of the Scottish Junior Gas Association—Western District—held their second annual dinner in Sloan's Café, Argyle Arcade, Glasgow, on Saturday. Mr. ALEX. WILSON, of Glasgow, presided over a gathering of eighty, among whom there was a large representation of gas managers in the West of Scotland.

The CHAIRMAN said that before they went on with the programme, perhaps they would allow him to thank the Council for the honour they had done him by asking him to preside. He took a very deep interest in all that pertained to them, and was gratified at the continued success which was attending both the Association and its members. He would like to point out the good fortune—the deserved good fortune—of those gentlemen who had passed the Presidential Chair. He referred to Mr. J. Lowe, now of Auckland; Mr. J. Bell, of Kirkintilloch; Mr. J. M'Leod, of Greenock; and Mr. W. Wilson, of Falkirk. They showed by their work for the Association that they fully justified their selection to fill the most important position they had to confer on them. He had no doubt the holding of the presidency of the Association not only helped them to obtain promotion, but would also materially assist them in carrying out the duties of their new appointments. In wishing them success, he hoped the same good fortune would attend the present and future Presidents of the Association. He thought that the Association and its members were too modest and retiring. In these go-ahead advertising times, it was not sufficient to do good work and send out the best materials. They wanted to let folks know what they could do for them—that they could give them better value for their money than anybody else, and also that they were ready and willing to teach and show them the best methods of obtaining a full return for their money. Very few of the public knew of the great improvements which had been made in all kinds of gas appliances during the past few years. In lighting apparatus, inverted incandescent burners enabled consumers to obtain the same amount of light or more, at one-fourth of the cost, as compared with the most recent improvements made in other forms of lighting, besides being practically as convenient. The new makes of gas-fires and heating radiators were economical and effective, and, if generally used, would do much to purify the atmosphere of their cities. The recent advances made in water-heating arrangements for household purposes would, if generally adopted, save a large amount of worry and trouble to the women-folk; and the improvements in apparatus for manufacturing and trade purposes were too numerous to mention. The Association would do well to bring these facts into prominence, and should take steps to have the proceedings reported in the Daily Press, as well as in their own journals, to keep the public well posted as to the advantages their business could afford them. He had been induced to make these remarks because of the publicity given to the proceedings of other societies. In the "Glasgow Herald," note had been taken of a paper read at the Pharmaceutical Society giving the results of some experiments made on the gas supplied to Edinburgh. To the ordinary reader, or to the "man in the street," the statements made might seem rather alarming. In fact, some folks might take them so much to heart that, with a little kindly advice from opposing sellers of light and heat, they might consider the advisability of discontinuing the use of so noxious a mixture as good coal gas. These chemists stated that they found, on one occasion, 0·2 gramme of sulphuric acid from burning 130 cubic feet of gas; and, taking the consumption in Edinburgh, this would represent some 3 tons of sulphuric acid each year thrown into the air. From the tone of the paper, and the discussion on it, one wondered that any of the Edinburgh folks were alive to tell the tale. What were the real facts of the case? In Glasgow, they used over 700,000 tons of coal a year; and if this coal were burned in the usual way, no doubt a very large amount of sulphur would be thrown into the air. But in the process of gas manufacture, a certain amount of the sulphur was left in the coke. The remainder, with the exception of very slight traces, was all extracted from the gas during the process of purification. The amount of sulphur left in the gas as it was supplied to consumers was so infinitesimal that their Corporation Chemist, during some recent experiments on gas-stoves, had the greatest difficulty in obtaining even slight traces in the êxit gases of the chimney, when considerable quantities were being burned in the stoves. In the tests referred to, he took it that the gas was consumed in a suitable manner to get the results named; but if the gas had been burned in the ordinary manner, with the absence of moisture, no such results could have been obtained. The Association and its members would do good both to the gas industry and the general public by giving as much publicity as possible, not only to all questions relating to the manufacture of gas, but also to its proper use by consumers.

Mr. T. LIGHBODY (Renfrew) proposed the toast of "The Junior Gas Association." To belong, he said, to the Association was a good thing in many ways. Each individual member was specializing in some particular part of the work, which was a thing he could not do when he got charge of an undertaking, because there were then so many things which it would be incumbent upon him to do.

The PRESIDENT (Mr. A. H. Whitelaw, of Glasgow) acknowledged the kind remarks made by both the Chairman and Mr. Lighbody,

and said that, as he was not replying for himself, but for the Association, their observations were quite correct, and their commendations were well deserved. The gas industry had a great future before it; and the Junior Association would try to prove themselves capable of using the opportuities of the future, and of helping on the progress of scientific gas manufacture. He took the opportunity of thanking the honorary members for the loyal support which they had given them; the gas managers who had invited them to inspect their works; the members who had read papers before the Association; the Technical Press for the interesting and good reports they gave of all their proceedings; and everybody who had done anything to help the Association.

The CHAIRMAN congratulated Mr. Whitehead upon winning the medal which was presented by Mr. Lighbody, one of the honorary members, for the best paper read before the Association last winter. Mr. Vass, another honorary member, had offered a medal for this year. This showed the interest which the honorary members took in the Association. The way the medal was awarded, he understood, was that the papers were submitted to a small Committee of the honorary members; and they adjudged which was the best. This took the matter out of the hands of the Council; and it kept the honorary members in touch with the Association. He had much pleasure in presenting the medal to Mr. Whitehead. He also proposed the health of Mr. Whitehead, which was duly honoured.

The medal was of gold, with an engraving on one side representing an open book with a lamp burning, and writing materials in front of it; and on the other side, an inscription surrounded with a wreath of laurel leaves.

Mr. T. H. WHITEHEAD (Provan Chemical Works), in responding, thanked Mr. Lighbody for presenting the medal. It was evident to him that the Junior Association represented a most powerful organization of the gas, chemical, and engineering industry; and he felt sure that, through the Association, the individual members were all receiving benefit.

Mr. T. WILSON (Coatbridge) proposed the toast of "Kindred Associations." Regarding the usefulness of the Junior Association, he said it brought them together, and they discussed topics connected with their business, from the coal to the burner; and it was by this interchange of opinions that they obtained their education. He had no doubt the success of the industry was largely due to these Associations—and, of course, to the assistance of the Press, in publishing their transactions.

Mr. J. D. SMITH (Stirling), President of the North British Association of Gas Managers, in responding, said he had only been at one meeting of their Association—the visit to the Coatbridge Gas-Works—but he was pleased to see the interest the large number of members present took in the practical methods of gas manufacture. Visiting different works was the best method of gaining knowledge, because of the opportunity it gave them of comparing ideas. It was quite unnecessary for him to say that they had the best wishes of the North British Association, whose doors were always open to them, either as members or associates.

Mr. A. SMITH (Tradeston) proposed the toast of "The Hon. Secretary," who, he said, though seldom heard at their meetings, did an immense amount of work for the Association.

The HON. SECRETARY (Mr. G. Braidwood, of Dawsholm) returned thanks; expressing the opinion that when a Secretary saw his efforts crowned with success, in a meeting such as that, it was all the thanks he could wish for.

According to a paragraph in the "Engineer," the calorific power of pressure gas made with a jet of superheated steam is usually considerably higher than that of suction gas. In the former, the percentages of hydrogen and carbon monoxide are higher, while the percentage of nitrogen is lower; and if the gas is to be used for heating purposes in small burners, or in blowpipes, it is better to use pressure gas than suction gas. In many operations, it would, in fact, be almost impossible to use suction gas, as, after the gas had been washed and cooled, its flame temperature would be too low, especially if air at pressure were employed to burn the gas. But for driving engines, suction gas is, of course, used with excellent results, provided the engines are properly adjusted for it. An engine worked by suction gas develops a lower maximum power than it would with pressure gas. This loss is, however, not important in a small or moderate-sized engine.

A telegram from St. Petersburg to the "Financial News" says: Among the fiscal proposals to be submitted to the Duma within the next few days is a tax on the consumption of coal gas in Russia. It is suggested that the rate on gas for illumination should be 4 copecks per 100 cubic feet, but that gas intended to be utilized industrially should be exempt. From inquiries made throughout the country, the Minister of Finance states that there are now in Russia 117 gas-works, of which 22 are gas undertakings pure and simple, while 195 form part of other enterprises. In 1905, the total production of gas was about 3000 million cubic feet, of which 84·5 per cent. was used for lighting and 15·5 per cent. for power. The independent factories were responsible for the manufacture of 92·4 per cent., and the departmental concerns for 7·6 per cent. Calculated on the total production, the former supplied to their customers 55·8 per cent. for private lighting, 20·7 per cent. for street lighting, 13·9 for power, and used 2 per cent. themselves; while the latter provided 6 per cent. for private lighting, and 1·6 per cent. for commercial purposes.

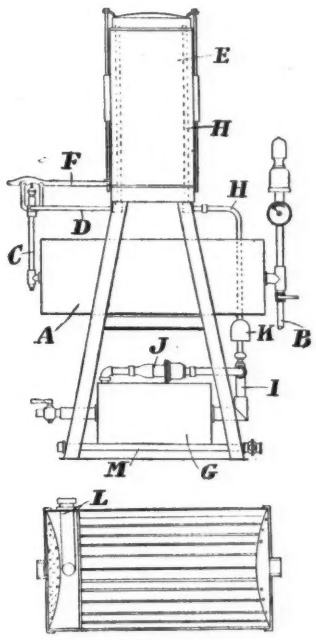
REGISTER OF PATENTS.

Carburetting Apparatus.

SMITH, S., of Tooting Junction, S.W.

No. 26,461; Nov. 30, 1907.

This invention consists in providing a reservoir or container for storing a supply of air under pressure which is automatically and intermittently fed to a holder and thence passes to a vessel in which the gas is produced.



Smith's Carburettor.

The illustration shows a front elevation of the apparatus, and an enlarged part sectional view of the carburetting vessel itself.

Air is supplied to the vessel A at a high pressure through the inlet pipe B. The air in the container passes through pipes C D to a holder or reservoir E; a needle valve being situated between the pipes C D to regulate the supply of air to the holder. The valve is operated automatically and intermittently by the rise and fall of the holder bell (as the air contained in it is used up) through the medium of a rod connected to the top of the bell and lever F which is pivoted to the valve. The lever is shown depressed; and, consequently, the valve is open, and air can pass from the container to the holder. When the carburettor G is working, air passes from the holder, down the pipe H, into the end of the carburetting vessel by way of the pipe I. Air from the holder also passes into the opposite, or outlet, end of the carburetting vessel, or to an independent gasholder by way of the pipes above; a valve J between the pipes regulating the air to this end of the carburetting vessel. When using an independent holder for storing the gas from the carburetting vessel, the valve is arranged so as to supply air to the gas as it issues from the gasholder. The air before it enters the carburettor is preferably heated by coiling a portion of the pipe H over which a shield or cover K is placed—a bunsen burner flame bearing upon this coiled portion.

The valve J which regulates the air from the holder E to the carburetting vessel G is preferably constructed as described in patent No. 19,454, of 1908.

The carburetting vessel, as shown separately, contains sheets or blocks of any material capable of absorbing carburetting liquid; and at the inlet and outlet end of this vessel is arranged a perforated dished metal plate to split up the air as it passes through the carburettor. Also provided in front of the dished plate, at the outlet end, is a gauze partition L, and between the partition and the plate is a packing of fibre or loose wire, or other similar material, to assist in splitting-up the air. A gauze disc is also placed at the mouth of the carburettor outlet for this purpose. The pipe M is provided for the purpose of supplying the carburetting liquid and for drawing off the heavy hydrocarbon oils.

Gas and Water Meters.

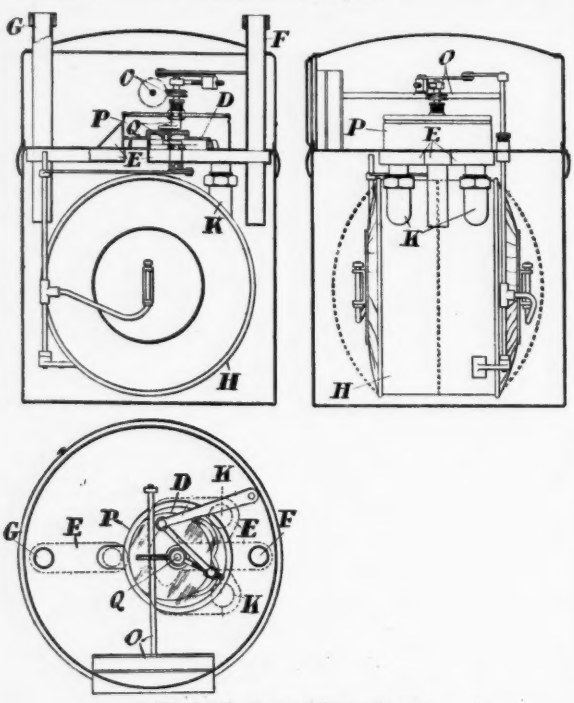
SUTHERLAND, A. G., of Birmingham.

No. 27,602; Dec. 14, 1907.

This invention relates to gas and water meters having upper and lower compartments divided by a valve plate or partition, the attachment to the lower side of the plate of the inner measuring chambers with the associated motion transmitting mechanism, and the connection of the two compartments by a single joint, being so arranged that, on the disconnection of the joint for inspection or repairs, the whole of the internal parts of the meter in the lower compartment are withdrawn with the removal of the upper compartment.

The patentee adopts a circular form of body, the lower part serving as a measuring compartment and the upper part for the controlling and recording mechanism. The two compartments are divided by a partition or valve plate which carries a rotary controlling valve D and a

number of passages E whereby the inlet and outlet pipes F G are put into communication with the measuring compartment and either of a pair of dilatable chambers carried by the plate. The chambers are comprised by a cylindrical outer part or trunk H containing a central partition and having secured to each outer edge a flexible and impervious cover or diaphragm. Connection between each chamber and the appropriate passage on the valve plate is effected by a branch pipe K. The motions of the diaphragms are transmitted by ordinary devices to the valve-actuating mechanism, and also the usual recording mechanism O, supported on the valve plate or on the trunk H of the dilatable compartments. On disconnecting the joint between the upper and lower compartments and separating them, the whole of the interior comes away with the upper portion—thus rendering the parts "very conveniently available for inspection or repair."



Sutherland's Gas and Water Meters.

The valve and its seating are constructed to control the passage of gas (or water) from the valve chest P through the three measuring chambers—those within the part H and that formed by the lower outer part of the meter case—to the outlet pipe F. The valve is preferably made of aluminium. To rotate it, vertical stems Q are employed in conjunction with links and levers connected to the diaphragm-actuated parts of the mechanism; the stems being cranked and connected to the upper and lower sides of the valve as shown.

In gas-meters, the joint between the upper and lower portions is preferably soldered; but in water-meters, it is formed by abutting flanges on the upper and lower parts, together with screws and jointing material. In water-meters, too, excessive outward movements of the diaphragms, under the action of excessive pressure in the inner measuring chambers, may be prevented by perforated metal guards or caps, as indicated by the dotted lines.

Incandescent Mantles.

BRITISH CEROFIRM COMPANY, LIMITED; a communication from the Cerofirm-Gesellschaft mit Beschränkter Haftung, of Berlin.

No. 2240; Jan. 31, 1908.

This invention relates to improvements in known methods of preparing tubes made from fabric of artificial silk, for producing incandescent mantles possessing a uniform illuminating power, "so that the manufacture of these incandescent mantles on a large scale is rendered easy and possible.

In their specification, the patentees say: For some years past endeavours have been made to use tubes made from fabric of artificial silk for the production of incandescent mantles, since the artificial silk presents certain advantages over cotton, ramie, &c.—see, for instance, the patents granted to O. Knöfler, No. 11,038 of 1895 and No. 5366 of 1900; also an article on "The New Plaissetty Mantle" in the "JOURNAL OF GAS LIGHTING," year 1902, page 1133, and Boult's (Plaissetty) patent No. 20,747 of 1901; and also the report of a lecture by Professor Drehschmidt in the "JOURNAL OF GAS LIGHTING," year 1906, pages 383, 465, and 519. However, the artificial silk, owing to its peculiar nature, presents at the same time considerable difficulties, which require to be overcome. It has been proposed to soak the tubes impregnated with solutions of nitrates of thorium and cerium in an alkaline liquid—for instance, ammonia—so as to turn the rare earths into hydroxides (see the above-mentioned patent No. 20,747 of 1901); but this method is objectionable, for reasons which need not be entered into. Other experimenters have substituted, for alkaline liquid, a solution of peroxide of hydrogen (see patent No. 15,295 of 1906), whereby incandescent mantles are produced which are very soft, elastic, and durable in the highest degree. Unfortunately, this method presents the defect that the hydrogen peroxide renders only the thorium combination—*i.e.*, hydrated peroxide of thorium—insoluble in water, and not the cerium combination; so that the latter is during the manipulation extracted from the tube. To prevent this, it was necessary to add to the impregnating liquid—that is, a bath of hydrogen peroxide—an empirical excess of cerium so that the percentage of cerium in the resulting incandescent mantle will necessarily vary. As the colour of the light and the illuminating power of the incandescent mantle depend upon a very small percentage of cerium in proportion to that of thorium, it is obvious that it is most difficult to produce by this method incandescent mantles of a uniform illuminating power, as the latter will be influenced by the least variation in the percentage of cerium. The quantity of cerium contained in the bath of hydrogen peroxide will necessarily vary after the passage of every consecutive tube through the bath; and therefore the percentage of cerium in the several incandescent mantles cannot be constant.

The present invention relates to improvements in the above-mentioned method, and can be used whether the mantle is made of natural threads or of artificial filaments, and whether the mantles are initially impregnated with the nitrates or with other salts of thorium and cerium.

The improvements consist in using, in addition to the peroxide of hydrogen, such substance or substances as, in conjunction with the peroxide of hydrogen, will render the resulting cerium combination insoluble without in the least impeding the formation of an insoluble thorium combination under the action of the peroxide of hydrogen. Such substances are all weak acids and their salts, which are capable of hydrolizing the cerium. Various organic acids and their salts—such as the acetates and lactates—are especially suitable.

It has been discovered, the patentees proceeds, that the acetates, when added to the peroxide of hydrogen, do not hinder the precipitation of the thorium combination. The tubes, impregnated with a solution of nitrates or other salts of thorium and cerium, may, therefore, be passed through a bath of peroxide of hydrogen to which an acetate has been added, for producing by drying, burning-off, and calcining, as usual, incandescent mantles possessing uniform illuminating power and colour of light. It is to be remarked, however, that in this method, free acids must be avoided as much as possible, so as to ensure the desired effect.

Lactic acid added to the bath of peroxide of hydrogen will also produce insoluble combinations of cerium, thorium, and other rare earth metals. The lactic acid may, therefore, be used in place of the acetate for the production of incandescent mantles of a similar excellent kind. In this case also, as before, free acids must be avoided as much as possible.

Formic acid may be used in place of the acetate or the lactic acid; but it is capable of precipitating the rare earths from weak acids only—such as acetic acid. Malic acid and other similar acids show a behaviour similar to the formic acid. Any of the salts formed of formic acid, or malic acid, &c., and of suitable bases, can precipitate the rare earths from any acid. In this case, it is advisable to more or less neutralize the free acid in proportion to the organic acid used. The bases employed for forming the salts should be so chosen that the salts produced are capable of being easily removed from the tube of fabric, whether it be by washing or in a subsequent stage of the process during the burning-off or calcination by evaporating or disintegrating. For bases, ammonia combinations are preferred, in so far as they do not disturb the reaction.

The method of producing the incandescent mantles from tubes of fabric made from natural threads or from artificial silk may otherwise be as usual—the tubes of fabric are impregnated with solutions of nitrates or other suitable salts of thorium and cerium, then dried, next impregnated with hydrogen peroxide to which a substance of the kind described above has been added, thereupon dried, burnt, and calcined.

APPLICATIONS FOR LETTERS PATENT.

26,394.—STEVENS, J. H., and TULLY, C. B., "Incandescent gas-lamps." Dec. 7.
26,426.—PARRY, H. B., "Method to generate gas from carbide of calcium to obtain a dry residue." Dec. 7.
26,435.—BISÚS, J. M., "Acetylene generators." Dec. 7.
26,447.—WUST, F., "Gas-producers." Dec. 7.
26,475.—KOLLER, K., "Distilling gas from brown coal and lignite." Dec. 7.
26,481.—SCOTT-SNELL, E., "Producing carburetted air." Dec. 7.
26,514.—ROGERS, A., "Atmospheric gas burning." Dec. 8.
26,586.—DAVIS, G. K., "Extracting tar from gas." Dec. 8.
26,618.—HANWELL, H. W., "Telescopic gas-pendants." Dec. 8.
26,658.—GALLACHER, J., "Incandescent gas-fittings." Dec. 9.
26,718.—BROWN, T. J., and HANDS, G., "Controlling the supply of gas to burners and igniting same." Dec. 9.
26,719.—FLETCHER, E., "Compression of gas or air for lighting or heating purposes." Dec. 9.
26,778.—MARTIN, R.W., "Prepayment meters." Dec. 10.
26,788.—POLESCHOWSKY, J., "Governor for fluids and liquids." Dec. 10.
26,985.—GINMAN, R. H., and BROWN, R. H., "Stop-valves for liquids and gases." Dec. 12.
27,005.—SPARKS, E., "Gas-cocks." Dec. 12.
27,042.—GIBBS, G. J., "Measuring flow through pipes." Dec. 12.
27,045.—SABATIER, P., "Manufacture of methane or methane and hydrogen." Dec. 12.

Girls as Gas Inspectors.—According to the correspondent of a London paper, the Chicago gas authorities have installed young lady inspectors of meters in place of men. The girls wear neat uniforms, and will answer all complaints by personal calls at the houses of the consumers.

Accident to a Gas Manager.—While fixing new mantles to the gas-fittings at "Blenheim," Torrington, the residence of Major Mallet, on Monday last week, Mr. F. W. Selby, the Manager of the Gas Company, fell, and sustained injuries so serious as to necessitate his removal to the North Devon Infirmary at Barnstaple, where he underwent an operation the same evening.

CORRESPONDENCE.

[*We are not responsible for opinions expressed by Correspondents.*]

The Livesey Memorial.

SIR,—In our consideration of the form which the Livesey memorial should take, are we not bound to pay the greatest regard to what would have been the feelings of him whose memory we desire to perpetuate? Judged thus, the Leeds Professorship scheme stands far in advance of its rivals. Sir George stated at the last Institution meeting that he had only performed the *rôle* of beggar twice previously—for the Crystal Palace Gas Exhibition in 1882, and for the Welsbach Patent Fund quite recently. I knew Sir George well enough to be able to affirm that he was the last man in the world to associate himself with, and advocate, a financial responsibility, unless he was perfectly satisfied that the object was a good one. In making the Leeds Professorhip our memorial, therefore, we are able to provide in perpetuity for the carrying on of a work which Sir George himself may be said to have initiated.

I trouble you with this letter in the belief that a further consideration of all the circumstances will lead Mr. J. H. Cornish, and probably others who may be of his opinion, to the same conclusion as was arrived at by the meeting, which was attended by representatives from all parts of the United Kingdom.

CHARLES CARPENTER.

South Metropolitan Gas Company,
Dec. 19, 1908.

SIR,—In your comments on my observation re the Livesey Memorial Fund, you go rather out of your way to make me appear to contradict previous opinions. Please show me where I have ever thought that the Institution should have a home costing more than £5000, and that not from an outside source of a fortuitous kind, but from its own members' contributions. I still think that ought to be carried out in one of the older roomy houses in Westminster where a Library, Committee Rooms, and Secretary's staff could be accommodated; and I am prepared to contribute at once to such a purpose. But a £20,000 building I again say would be uselessly extravagant and impracticable.

H. E. JONES.

Palace Chambers, Westminster, Dec. 19, 1908.

[With regret it is found that Mr. Jones thinks we went rather out of our way in the editorial comments last week, to make him appear to contradict previous opinions. Mr. Jones was merely quoted against himself to show there were arguments in favour of the home for the Institution—the project that, on first blush, took our fancy, until further consideration, and the claims put forward at the meeting, satisfied us that the Livesey Professorship of Gas Engineering and Fuel at the Leeds University was, for the purpose, and in view of the open invitation to all and sundry in the industry to subscribe, the best of the schemes submitted. "Please show me," remarks Mr. Jones, "where I have ever thought the Institution should have a home costing more than £5000." Mr. Jones might just as well ask us to show him where he has ever said that he is prepared to present the Institution with a home costing that amount. However, we have already declared that a £20,000 home would be, not useless, but extravagant and hopelessly impracticable; but it will be noted that if the home scheme is ever seriously taken up, Mr. Jones would be (as his friends know full well) one of the first contributors to the cost.—ED. J.G.L.]

Mr. Ellis's Article.

SIR,—I am much interested in Mr. H. D. Ellis's observations on the case *Davies v. Gaslight and Coke Company*. I do not think, however, that secretaries generally recognize a difference between the books directed to be kept by the Companies Clauses Consolidation Act, 1845, relating to shareholders and stockholders respectively. The usual practice of "Sealing the Register" (which is provided for in section 9, and not in section 63) at the ordinary meetings of companies whose capital consists entirely of stock, is an illustration of this point.

GERALD H. S. IORNS.

Ilford, Dec. 17, 1908.

Testing Consumers' Meters.

SIR,—Under the sub-heading "Gas-Meters," on p. 766 of the last issue of the "JOURNAL"—being part of a very interesting paper read by Dr. W. B. Davidson before the Midland Junior Gas Engineering Association on "Measuring, Testing, and Recording"—there appears the following: "It would be an advantage to the gas manufacturers if the meters of consumers were tested by a more accurate system than is at present in use." This may be presumed to apply more particularly to the practice followed by inspectors when officially testing and stamping consumers' meters under the Sale of Gas Act, and is therefore of general interest. If Dr. Davidson would kindly state what, in his opinion, is a right and proper system to follow, it would undoubtedly be of great value.

F. COE.

Nottingham, Dec. 19, 1908.

The Supply of Shareholders' Lists.

SIR,—A simple way to solve the difficulty in this matter would be for a stock sentence to be added to the reports issued to shareholders, cautioning them "that, as the Directors were legally bound to issue such lists, they could only warn them not to accept, without investigation, prospectuses which might contain exaggerated and misleading comparisons between insignificant undertakings and others well known to be important and prosperous, such as had recently been exposed in the Courts as fraudulent."

That a shareholder should have access to the list of his fellows is only right and just, for many obvious reasons; and it is hopeless to endeavour to upset such a radical privilege, either in the Courts or by the Legislature. But we can cut the ground away by repeated warnings, either in our reports or on our dividend warrants.

H. E. JONES.

Marden Ash, Ongar, Dec. 19, 1908.

LEGAL INTELLIGENCE.

LIABILITY FOR PAYING THE "KING'S CLOGG."

In the Court of Appeal last Saturday, the Master of the Rolls and Lords Justices Fletcher Moulton and Farwell delivered judgment in the appeal of the Metropolitan Water Board against the judgment of Mr. Justice Warrington, holding them liable to pay the owner of what is known as the "King's Clogg" (which, as readers may remember, was a charge upon the New River Company) the sum of £400 per annum, with arrears from the year 1902. The proceedings in the Lower Court were reported in the "JOURNAL" for the 16th of June last (p. 709). There was no doubt as to the plaintiff—Sir F. E. Shafto Adair—being entitled to this annual payment from somebody; and the question at issue was whether it was a liability attaching to the Company, and, as such, was transferred to the Board under the Metropolis Water Act, 1902, or whether it was a charge on certain specific shares in the Company, so reducing their value, and throwing on the Company the duty of providing for the payment of the "Clogg" before distributing the compensation money among the individual stockholders.

The appeal was argued at great length early last month by Mr. Danckwerts, K.C., and Mr. A. B. Shaw for the Board; by Sir R. Finlay, K.C., Mr. Buckmaster, K.C., and Mr. Sargant for the New River Company; and by Mr. Rowden, K.C., and Mr. Tomlin for the plaintiff.

The Master of the Rolls said he was of opinion that the decision of Mr. Justice Warrington was correct; and the reasons which influenced him in coming to his conclusion were so fully set forth in the judgment of Lord Justice Farwell, that he did not propose to state them. Lord Justice Fletcher Moulton read an elaborate judgment giving the reasons which had led him to come to the opposite conclusion. It appeared to him, from the history of the case, that the "Clogg" was not a burden on the Company but only on certain shares; and though the Company's was the hand to distribute the burden, it was borne by the holders of such shares. The sole question to his mind was whether the "Clogg" related to the amount of the net profits of the Company or to their partition; and he could see only one answer—viz., that it did not affect the liabilities or income of the Company itself, but was deducted from the dividends on certain specified shares. He thought, therefore, that the appeal should be allowed, and that the proper judgment should have been to dismiss the action as against the Board with costs, to be paid by plaintiff, and to give judgment for him against the Company, with costs. Lord Justice Farwell then read his judgment, giving in detail his reasons for concurring in the judgment of Mr. Justice Warrington. In the result, therefore, the appeal was dismissed, with costs.

Gas Desulphurization Company, Limited and Reduced.

Mr. Justice Warrington, in the Chancery Division on Saturday, heard the petition of the Gas Desulphurization Company, Limited and Reduced, for the confirmation of the reduction of capital from £15,100, divided into 1510 shares of £10 each, to £3020, divided into 3020 shares of £1 each. It was proposed to return to the holders of the 1510 shares paid-up capital to the extent of £2 per share; to cancel paid-up capital to the extent of £6 per share; and then to divide each of the 1510 shares into two fully paid-up shares of £1 each. His Lordship sanctioned the reduction, and restricted the use of the words in the Company's title "and Reduced" to another month.

Promotion of the "Cerofirm" Mantle Company.

In the King's Bench Division of the High Court of Justice last week, before Mr. Justice Darling and a Common Jury, Mr. Frederick Lawrence Rawson, lighting specialist and engineer, sued Mr. Herbert Sanguinetti, financial agent, to recover £100 for services rendered in connection with the formation and flotation of the British Cerofirm Company, Limited, by the defendant, for the placing on the market of a new gas mantle. The plaintiff's case was that by an agreement entered into in June, 1907, he was retained to advise the defendant at a remuneration of £500 in cash and £500 in fully-paid shares. It was further agreed that in certain specified circumstances, which had come about, the plaintiff's remuneration was to be reduced one-half. The defendant had paid the plaintiff £150 in cash, and had transferred to him 250 fully-paid shares; and the latter sued for the balance, £100. The defendant's case was that the plaintiff had not fulfilled his part of the contract by providing the required capital. The Jury returned a verdict for the plaintiff; and his Lordship accordingly entered judgment for the amount claimed, and declined to grant a stay of execution.

The Bankruptcy of Mr. Sydney Willey.—Last Saturday's issue of the "Croydon Advertiser" says: "We understand that a summons has been issued for criminal libel against an Exeter Justice of the Peace by Mr. Willey, of Dingwall Road, Croydon, which will be heard at the Croydon Police Court on Thursday, December 24th."

PARLIAMENTARY INTELLIGENCE.

THE LEGISLATIVE PROPOSALS OF THE GASLIGHT AND COKE COMPANY.

The Company's Bill.

In the "JOURNAL" for Nov. 24 (p. 571), there was a full summary of the notice given by the Gaslight and Coke Company of their intention to promote a Bill next session with the object, among other things, of obtaining authority to amalgamate with the West Ham Gas Company. We have now a print of the Bill, which consists of 39 clauses and two schedules; and the following are its principal features.

The preamble sets forth that the Company were originally incorporated by Royal Charter in the year 1812, and received further powers under various Acts of Parliament; being finally incorporated in perpetuity by an Act passed in the reign of George the Third (59 Geo. III., cap. 20). By an Act obtained by the Company in 1868, all the prior Acts were repealed, and the Company were continued and the provisions of all prior Acts consolidated and re-enacted. By this and subsequent Acts the Company are empowered to manufacture and supply gas within a large part of the County of London and parts of the Counties of Middlesex and Essex. The West Ham Gas Company were incorporated in 1856 with powers of supply within the parish of West Ham and other parishes and places in the County of Essex. Their capital consists of £895,872 of consolidated 5 per cent. stock, subject to the sliding-scale, and £210,000 of 5 per cent. preference stock; and the Company have also issued debenture stock to the nominal amount of £253,300. As the areas of the two Companies adjoin, the West Ham Company have agreed to sell, and the Gaslight and Coke Company to purchase, their undertaking, on the terms set forth in the Bill. In order to give effect to this purchase, which it is considered would be advantageous to consumers of both Companies, the authority of Parliament is sought.

Clauses 1 and 2 contain the short title of the proposed Act, and indicate the Acts to be incorporated; and clause 3 is the interpretation clause. Clause 4 sets forth that the undertaking of the West Ham Company is to be transferred to the Gaslight Company on and from Jan. 1, 1910; but by the succeeding clause the former Company are to continue incorporated till the 1st of February. Clauses 6 and 7 relate to the issue of stock by the Gaslight Company, and are as follows:—

The Gaslight Company shall forthwith, after the date of transfer, issue to those persons who immediately prior thereto held stock of the West Ham Company stock of the Gaslight Company as follows (that is to say): To each holder of consolidated ordinary stock of the West Ham Company the sum of £118 ordinary stock of the Gaslight Company for each £100 of such consolidated ordinary stock fully paid up; to each holder of 5 per cent. preference stock of the West Ham Company the sum of £125 of 4 per cent. consolidated preference stock of the Gaslight Company for each £100 of such 5 per cent. preference stock fully paid up; and so in proportion for any less amount than £100 of the stock of the West Ham Company, or for any of such stock which is not at the date of transfer fully paid up.

The Gaslight Company shall forthwith after the date of transfer issue to each holder of 4 per cent. debenture stock of the West Ham Company the sum of £133 6s. 8d. of 3 per cent. consolidated debenture stock of the Gaslight Company for each £100 of such 4 per cent. debenture stock fully paid up; and so in proportion for any less amount than £100 of the debenture stock of the West Ham Company or for any of such debenture stock which is not at the date of transfer fully paid up.

Clause 8 relates to the fractional parts of £5 of stock, and clauses 9 and 10 sanction the creation of ordinary, preference, and debenture stock of the Gaslight Company for the purposes of the Act, and set forth that they are to form part of the existing stocks. Clause 11 specifies that the stock of the Gaslight Company is to be equivalent for all purposes to that of the West Ham Company; and clauses 12 and 13 relate to the exchange of certificates and the transfers of stock. Clause 14, which deals with dividend, is as follows:—

The Gaslight Company shall on or as soon as reasonably practicable after the 1st day of March, 1910, pay to the persons who immediately before the date of transfer held preference stock or consolidated ordinary stock of the West Ham Company out of the profits of the West Ham Company for the half year ending the 31st day of December, 1909, the dividends following (that is to say): (*a*) On such preference stock a dividend for that half year at the rate of 5 per cent. per annum; (*b*) on such consolidated ordinary stock a dividend for that half year at the rate at which (regard being had to the available profits of the West Ham Company) such dividend would have been payable if this Act had not been passed—subject in each case to deduction of income-tax; and on and from the date of transfer the accounts of the West Ham Company shall be incorporated in and dealt with as part of the accounts of the Gaslight Company.

Clause 15 repeals the unexercised powers of the West Ham Company of raising capital and borrowing; and the next clause provides for the application of the Gaslight Company's Acts to the limits as extended by the proposed Act. Clause 17 sets forth that the provisions of the Gas-Works Clauses Act, 1871, with respect to the testing of gas and to penalties are to apply to the Gaslight Company within the West Ham district, except that the apparatus to be used for such testing, and the mode of making the tests, are to be the same as shall from time to time be prescribed by the Metropolitan Gas Referees for testing the gas supplied within the Metropolis.

Clauses 18 to 23 deal with pending actions, contracts, and the collection of outstanding debts, and set forth that the books of the West Ham Company are to be evidence as to the holders of stock, and that the officers of the Company are to be accountable for the books. Clause 24 provides that one of the Directors of the West Ham Company is to join the Court of the Gaslight Company; and by the succeeding clause the other Directors are to be paid as compensation a sum equivalent to six years of their respective annual remuneration, calculated on the average of the three years immediately preceding the date of the transfer. Each of the Auditors is to be paid a sum equal to three years' remuneration. Clause 26 deals with the officers of the absorbed Company, and it is as follows:—

(1) The Gaslight Company shall, subject as is hereinafter provided, take over and employ such of the officers of the West Ham Company who shall be in the employ of such Company at the date of transfer as the Gaslight Company may require, and as shall be willing to enter the service of the Gaslight Company. The officers so taken over shall continue to hold their respective offices and employments on the same terms and conditions as they held the same under the West Ham Company until duly determined by the Gaslight Company, but subject to the same obligations as are imposed upon the officers of the Gaslight Company to join any funds of that Company, and shall receive from the Gaslight Company not less than the salaries and agree emoluments which they are receiving from the West Ham Company at the date of transfer.

(2) If the Gaslight Company shall not then require the services of any such officer of the West Ham Company, or if any such officer, having a length of continuous service with the West Ham Company of fourteen years or upwards, shall not be willing to enter the service of the Gaslight Company, the Gaslight Company shall pay to him, by way of compensation for loss of office, such an amount as may be agreed between the Gaslight Company and such officer, or as, failing such agreement, may be determined by an arbitrator to be agreed upon, or in default of agreement appointed, on the application of the Gaslight Company or of such officer, by the President of the Institute of Chartered Accountants; and, subject as aforesaid, the provisions of the Arbitration Act, 1889, shall apply to such determination.

Clauses 27 to 29 provide for the carrying on of their undertaking by the West Ham Company until the date of the transfer; but it is specified that they are not to increase the staff or their salaries, and the Gaslight Company are to continue to pay pensions. Clause 30, bearing upon the price of gas, is as follows:—

As from the date of transfer, section 19 ["Fixing Maximum Price of Common Gas with Sliding-Scale as to Dividend"] of the Gaslight and Coke Company Act, 1876, section 15 ["Sliding-Scale as to Dividend on Ordinary Stock"] and section 16 ["Application of Net Profits after Providing for Dividends on Preference Stocks"] of the Gaslight and Coke Company's (Capital Consolidation) Act, 1898, and section 8 ["Alteration of Standard Price and Sliding-Scale as to Dividend"] of the Gaslight and Coke Company's Act, 1903, shall be, and the same are hereby, repealed, and the following provisions shall have effect in lieu thereof (that is to say):

(1) The standard rate of dividend on the ordinary stock of the Gaslight Company shall be £4 per cent. per annum, subject to increase or reduction in accordance with the scale hereinafter set forth.

(2) The standard price to be charged by the Gaslight Company for gas supplied by them shall be 3s. 3d. per 1000 cubic feet.

Provided that the Gaslight Company may increase or reduce the price charged by them for gas above or below the standard price subject to a reduction or increase in the dividend payable by the Gaslight Company on their ordinary stock as follows: In respect of any half year ending on the 30th day of June or 31st day of December during any part of which the price charged by the Gaslight Company shall have been a penny or part of a penny above the standard price, the dividend payable by the Gaslight Company shall, in respect of each penny or part of a penny by which the standard price shall have been increased, be reduced below the standard rate of dividend by 1s. 4d. on every £100 of ordinary paid-up capital, and so in proportion for any fraction of £100; and in respect of any such half year during the whole of which the price charged by the Gaslight Company shall have been 1d. or more below the standard price, the dividend payable by the Gaslight Company may, in respect of each penny by which the standard price shall have been reduced, be increased above the standard rate by 1s. 4d. on every £100 of ordinary paid-up capital, and so in proportion for any fraction of £100.

The clause goes on to provide that if the dividend payable in respect of any half year shall include a fractional amount less than ½ per cent. the Gaslight Company may defer the payment of such fractional amount until the payment of the next or some succeeding dividend, and shall, in their discretion, either add such fractional amount to, and pay the same with, such succeeding dividend accordingly, or add the same to the reserve fund. The net profits of the Company which remain after providing for the dividends on the several preference stocks are to be applicable in the first place to paying rateably and without preference or priority a dividend up to £3 10s. per cent. per annum on the 3½ per cent. maximum stock, and up to £2 16s. per cent. per annum on the ordinary stock. The 3½ per cent. stock is not in any half year to be entitled to any dividend in excess of this rate; but any surplus profits available after the payment of the dividends at the specified rates are to be applicable in payment of further dividends on the ordinary stock up to the amount permitted by law. In any half year in which the authorized price of gas does not exceed 4s. per 1000 cubic feet, and the authorized rate of dividend on the ordinary stock does not fall below £2 16s. per cent. per annum, the rate of dividend distributable on the 3½ per cent. stock is to continue to be 3½ per cent. per annum. But if in any half year the authorized price exceeds 4s., or the authorized rate of dividend on the ordinary stock falls below £2 16s. per cent. per annum, then for every increase in such half year of 1d. in the authorized price of gas above 4s., or fall in that half year of 1s. 4d. in the authorized rate of dividend on the ordinary stock, the rate of dividend on the 3½ per cent. stock is to be reduced by 1s. 8d. It is added that, subject to these provisions, the making of dividends on the 3½ per cent. stock and on the ordinary stock are to be subject to the provisions of the Companies Clauses Act, 1845, in this respect.

Clause 31 amends the section of the Gaslight Company's Act of 1876 relating to the formation of insurance and reserve funds, by substituting "half year" for "year," and "authorized rate of dividend" for "standard rate of dividend;" and clause 32 provides that, for the purposes of section 9 ["Redemption Fund"] of their Act of 1903, the average of the two half-yearly dividends which the Company shall in any calendar year be entitled to distribute is to be deemed to be the dividend to which they are entitled in respect of that year. Clause 33 provides for the addition of the insurance and reserve funds of the West Ham Company to those of the Gaslight Company. Clause 34 specifies that, as from the passing of the Bill, sub-section 1 of section 4 of the London Gas Act, 1905, relating to the illuminating power of the gas, is to read as if the word "fourteen" were substituted for the word "sixteen." Clause 35 sets forth that the remuneration of the Directors in any year is to be "such sum, not being more than £7500 or less than £5500," as they may determine; and it is to be divided as they shall decide by resolution. Clause 36 relates to the period of error in defective meters;

and the next clause repeals the four Acts of the West Ham Company. Clause 38 provides for the nomination, by persons in the Gaslight Company's employ, of others to transfer any stock of the Company held by them; and the last clause places upon the Company the payment of all the expenses in connection with obtaining the Act.

The two schedules contain the titles and dates of the West Ham Company's Acts which are to be repealed, and the regulations framed by the Company in regard to the nominations under clause 38 of the Bill.

THE COMPULSORY REDEMPTION OF PERPETUAL GAS ANNUITIES.

In the Heywood Corporation Bill as deposited for next session by the Agents (Messrs. Baker and Co.) a very important clause is included which, when passed, will enable the Corporation to compulsorily redeem their perpetual gas annuities—a power which other local authorities have often asked for and always been refused till this year, when Messrs. Baker and Co. secured its inclusion in the Padiham Urban District Council Act which received the Royal Assent on Aug. 1. The clause in the Heywood Bill, as submitted, is as follows:—

The Corporation may at any time after the 29th of June, 1943, require the holders of any annuities granted under section 27 [Gas Rates, &c., to be Charged with Gas Annuities] of the Act of 1867, and for the time being outstanding, to accept redemption of any such annuities on payment of the then fair value of the annuity or annuities so redeemed; and the amount of such value shall, if not agreed, be settled by arbitration in accordance with the provisions of the Arbitration Act, 1889, except that the arbitrator shall be nominated by the Local Government Board on the application of either the Corporation or the annuitant. And the Corporation may borrow at interest, on the security of the district fund and general district rate, and of the revenues of their gas undertaking, the amounts payable according to the award to be made by the arbitrator, or such part or parts thereof as the sinking fund then applicable for the purpose shall be insufficient to meet, together with all costs, charges, and expenses payable by the Corporation in respect or arising out of such arbitration or the redemption of such annuities. All moneys borrowed under the provisions of this section shall be repaid within such term, not exceeding 60 years, as the Local Government Board may prescribe.

EDINBURGH AND LEITH GAS SUPPLY.

Illuminating Power and Price of Gas.

Early in the year, it was mentioned in the "JOURNAL" on several occasions that the Edinburgh and Leith Gas Commissioners were applying to the Secretary for Scotland for a Provisional Order, under the Private Legislation Procedure (Scotland) Act, 1899, to authorize them to raise further money for their gas undertaking, extend the time specified for the completion of the Granton works, sanction the establishment of a superannuation fund, and confer additional powers, including a reduction of the illuminating power of the gas. At the time of the issue of the Draft Order in April last, we gave an indication of its scope; but as it has now been passed by both Houses, it may be of interest to reproduce a few particulars.

The Order is divided into five parts: (1) Preliminary; (2) finance and borrowing for the redemption of annuities; (3) extension of time for the construction and completion of works; (4) superannuation fund; and (5) miscellaneous. In the first part, it is set forth that, except so far as is otherwise provided, the Order is to take effect from the date of the Act confirming it; that the expression the "City of Edinburgh" means and includes the City and Royal Burgh of Edinburgh within the limits existing at the date of the commencement of the Order; and that the "limits of supply" are the present ones as extended by the Order. The second part confers upon the Commissioners additional borrowing powers to an amount not exceeding £800,000, which is secured on the rates, rents, charges, and other revenues under the provisions of their Acts of 1888 to 1902. The third part extends the time for the completion of the new gas-works at Granton till May 23, 1920, at which date the powers granted by the Act of 1898 in respect of these works are to cease. The fourth part of the Order, dealing with the superannuation of the officials and servants of the Commissioners, has been already dealt with.

The fifth part of the Order is devoted mainly to the subject of the supply of gas. It is specified that, from and after the commencement of the Order, the illuminating power of the gas is to be not less than 14 candles. The Corporations of Edinburgh and Leith may provide testing-places in the City Chambers, Edinburgh, and the Municipal Buildings, Leith; and these are to be deemed testing-places under the Gas Acts and the Order, in addition to the one at the Granton works. The quality of the gas is to be in all respects in accordance with the provisions of the Gas-Works Clauses Act, 1871. For testing the illuminating power, the No. 2 "Metropolitan" argand burner is to be employed in conjunction with either the bar or the table photometer, with the Harcourt 10-candle pentane lamp as the standard; and, in making the test, the burner is to be so used as to obtain from the gas the greatest amount of light. No penalty is to be incurred for insufficiency of pressure, deficient illuminating power, or excess of impurity in the gas when these defects arise from circumstances beyond the control of the Commissioners. The limits of supply under the Order are to include the parishes of Currie, Ratho, and Newton, in the county of Midlothian, and Kirkliston, in that county and Linlithgow. The Commissioners are authorized to charge differential rates as between gas supplied and used for private lighting purposes and that used for any other purpose. The rate in the latter case, however, is not to exceed that charged for gas supplied for private lighting, and it may be agreed upon between the Commissioners and any person or persons requiring the supply, having regard to the times and periods of supply and the quantity of gas used; and it is to be the same to all persons under similar circumstances. The Commissioners may allow discounts for prompt payment not exceeding 10 per cent., and, in addition, 15 per cent. in the case of large consumers. All discounts or rebates are to be of equal amount under like circumstances to all consumers; and notice to this effect is to be endorsed on every demand-note for gas charges. The Commissioners are empowered to amalgamate the offices of Treasurer and Collector, appoint the same person to both, and contribute to the employees' sick benefit society.

THE PROPOSED FEDERATION OF POTTERIES TOWNS.

An Agreement Arrived At.

The Select Committee of the House of Lords presided over by the Earl of Cromer, who have spent a great deal of time considering the Potteries Federation Bill, were informed when they sat last Wednesday that a settlement had been arrived at.

On behalf of the promoters, Mr. Ram, K.C. (in the absence of Mr. Balfour Browne, K.C.), stated that the conference suggested by the Committee to discuss the basis of settlement had come to an agreement, the heads of which were as follows:—

(1) Loan charges arising in respect of money borrowed and expended (other than on gas and electric undertakings) by the Councils before March 31, 1907, or expended on capital account before that date and subsequently borrowed, to be raised by rates levied in the respective districts, provided that loan charges in respect of loans for improvements on main roads are not raised after the expiration of a twenty years' period, but are a common charge.

(2) Loan charges in respect of loans applied for or new work put in hand after Dec. 15, 1908, and before the commencement of the Order (on March 31, 1910), to be borne by the district applying for the loan or work.

(3) All money received, or to be received, in respect of debts to which the loan charges relate, to be credited to the respective districts.

(4) Revenue assets and liabilities at the commencement of the order to be credited or debited to the respective districts within the first three years' rates.

(5 and 6) Differential rating to prevail for a period of twenty years, the towns paying in the following proportion: Hanley 100, Longton 85, Stoke 87, Burslem 96, Fenton 80, Tunstall 88.

(7) Differential rates to apply to all expenditure other than to the loan charges, which are made separate charges.

(8) No valuation of any kind whatever.

(9) Gas and electrical undertakings to be carried on by the Council of the new district; the consumers to be supplied at such a price that no profits are made. Any deficiency on any of the undertakings to be made good in the first instance out of the reserve fund (if any), and, failing that, out of the district fund, to which the debt shall be repaid by the undertaking.

(10) Provision to be made for the combining of gas or electrical undertakings when found to be desirable in the interest of economical management, subject to the approval of the Local Government Board; and if the Board are requested by not less than 200 consumers, they must hold a local inquiry before giving that approval.

(11) All costs of each town in connection with the Order to be paid by the new borough.

At the sitting of the Committee on Friday, Mr. Balfour Browne, on behalf of the promoters, stated that, in accordance with the directions of the Committee, the eleven heads of agreement had been put into the form of clauses, and the Order was now, with the exception of one or two items, an agreed one. The outstanding items referred to having been decided, the Bill embodying all the amendments was next day read the third time, passed, and returned to the House of Commons, where the amendments were considered and agreed to. Yesterday, when the prolonged session was brought to a close, it received the Royal Assent.

Subsequent to the agreement, Mr. Walton Stanley, the principal advocate of federation in Hanley, said in an interview: Hanley has obtained practically all she contended for in the promotion of the Bill. In the first place, she suggested the principle of differential rating; and the only alteration made by the agreement is that the period is extended from ten to twenty years. To this Hanley has no objection. Hanley has succeeded in securing, as an advance upon Mr. Alderman Geen's scheme, that the whole of the assets will be taken over by the new borough, instead of the floating assets only; and the provision has been eliminated from Mr. Geen's scheme that capital expenditure out of revenue should be compensated for. This has saved Hanley £50,000. The Bill now, happily, provides that the whole of the expenditure of the new borough shall be in common, instead of being divided between the different towns, as suggested by Mr. Geen. This does away with the difficulty that would have been occasioned by separate administrative areas, which might have provoked friction and prevented necessary improvements being carried out. Another advantage is that the financial relations are settled upon a common basis at once, instead of being a subject for controversy and division in the future. The Bill, as finally agreed, is virtually a return to the Bill as amended by the House of Commons; but the valuation clauses have been omitted, and this is a gain to Hanley, as Hanley might have had to make up a deficiency owing to her large rateable value. Another variation from the House of Commons Bill is that gas and electricity are to be sold at cost price, instead of profits being made; and this obviates many difficulties. It is a new Bill based on the House of Commons Order, and ought to give general satisfaction.

Sale of Shares in the Coatbridge Gas Company.—At a sale by auction last Tuesday, 200 £10 shares in the Coatbridge Gas Company fetched prices ranging from £17 3s. to £17 10s. each; the average being £17 7s. 0·9d., yielding at the present rate of dividend ($8\frac{1}{20}$ per cent.) 4·64 per cent. per annum.

MISCELLANEOUS NEWS.

COALITE LIMITED.

Professor Vivian B. Lewes on the Process.

The Ordinary General Meeting of Coalite Limited was held at Salisbury House, E.C., on Monday of last week—under the chairmanship of Mr. J. H. Smith.

The Secretary (Mr. E. H. Ronaldson) read the notice convening the meeting and the report of the Auditors.

The Chairman said the Company was registered in July, 1906, with a capital of £55,000, in 50,000 ordinary shares of £1, and 100,000 deferred shares of 1s., to acquire the patents of Mr. Thomas Parker, who was to receive the whole of the deferred shares, which were entitled to one-half the profits. Mr. Parker had during the past two years given them the benefits of various valuable improvements and discoveries in the treatment of bye-products, which were of probably greater value than the original patent rights purchased; and he constituted without doubt a real living asset of great worth. By his efforts the profits—originally estimated on a very conservative basis of something like 3s. 4d. per ton of coal treated—would be largely increased; and it was no exaggeration to say that these profits might reasonably be more than doubled. Simultaneously with his perfect fuel, he had produced gas, tar, and pitch of a superior character to any hitherto obtained, and also numerous bye-products of great value. At the outset they had to encounter the opposition which usually attended the pioneers of any new undertaking, and were subjected to criticism of the most hostile, caustic, and sceptical character.

THE QUESTION OF PATENTS.

From one quarter the validity of the patents was questioned, and in another it was maintained that a smokeless fuel could be produced almost anywhere and under any circumstances. But, disregarding these attacks, the Directors pursued the even tenor of their way, and applied themselves to the extension and development of the business. When he stated that they held Letters Patent for Germany and the United States, the sceptics had no ground whatever for their doubting allusions and attempts to depreciate the great value of Mr. Parker's discovery. Patents had been secured in 33 of the principal countries; while in 27 the applications were still under consideration. Generally, he might say that wherever coal was found, or a market for coalite was likely to exist, there they considered it desirable to apply for patents; and from no less than 27 coal-producing countries samples of the native coal had been tested and treated by the coalite process. Between Coalite Limited and the British Coalite Company there was a certain similarity, with, however, a very marked distinction. This consisted in the fact that whereas the British Coalite Company was essentially a manufacturing company, exercising exclusive control over the rights pertaining to the United Kingdom, Coalite Limited was not, nor was it intended that it should be, other than a promoting company for the purpose of disposing of the patent rights throughout the world. These foreign patent rights were without doubt of enormous value, more especially in markets remote from coal-raising areas, and dependent upon imported fuel. As to the disposal of the foreign patents, during the last few months the Board had been approached from a number of quarters and by a variety of interests; and they had been pressed to name the terms upon which they would be prepared to dispose of their rights. The difficulty had been not so much the disposal of the rights for a particular country, as to stave off the applications until such time as the Directors could more accurately determine the full value of the process from the latest working of a complete and improved plant, such as was now being erected at the Plymouth Gas-Works—having already been so successfully demonstrated at Wednesfield—and which had been accompanied by further discoveries of new bye-products almost daily of such character as to astonish even the inventor himself. When the value of the coalite process was being enhanced almost day by day, the Board attached increased importance and value to the rights for every foreign country. They looked forward to many transactions by which profits far in excess of their modest capital would be effected in even one single sale; while an increasing income from any share interest which might be secured as the result of such transactions must add to the value of the property. As some statements had appeared in the Press upon the subject, he might say that, when the Directors learned that the gas supply for St. Petersburg was to be open to public competition, they sent in a tender. The decision would take place in March; and the Executive Committee of the Municipality appointed to deal with this matter had recognized the coalite process as the most advantageous for the city, and had recommended the acceptance of the tender.

CLAIMS FOR THE SYSTEM.

The works of the British Coalite Company at Wednesfield had been visited by many persons from time to time, representing coal, gas, and financial interests from all quarters of the world; and in no single case that the Directors were aware of had any expression of opinion been given but that of admiration for the process and acknowledgment of the great value of Mr. Parker's invention. In some hostile articles that had appeared, it had been assumed by the writers that the prospective profits had been based upon the assumption that the Company were to capture the entire coal trade for domestic purposes, not only of the United Kingdom, but of other parts of the world; while the British and other navies were to be supplied for steaming purposes with oil produced from coalite tar as a liquid fuel. Needless to say, no such wild or chimerical ideas had ever entered the heads of the Directors. They strongly believed that when the results of the Plymouth and Barking installations became widely known, the superior claim of coalite as a fuel would be so overwhelmingly demonstrated that it would be in universal demand, and more especially must it appeal to the public in those numerous Continental and American cities where the use of smoke-emitting coal was prohibited. The fact should not be forgotten that coalite could be consumed in any grate. There was no need for any speculative and expensive alterations. It could be supplied on terms which would compete with any other fuel; while the economic advantages attending its consumption were so apparent that they were confident the demand would be only limited by the supply. There had been some attention lately drawn to this country's position in regard to the supply of oil as a liquid fuel for the Navy. He should feel obliged if the shareholders would be good enough to look at the various specimens of bye-products exhibited in the room, which had all been produced from coal treated by the Company's process. Among these would be found a specimen of a heavy oil admirably suited for steam-raising purposes. In the opinion of many competent authorities, and in the not very far distant future, liquid fuel would be used by all countries possessing a naval or mercantile fleet; and this oil could be produced by the coalite process.

AN INCREASE OF CAPITAL.

It had been said, in certain quarters, that progress had been somewhat slow; but those who said this could not have realized the great amount of work involved in promoting a company of the magnitude of the British Coalite Company Limited. They had been invited to instal a unit of the plant in a number of important places. Of course, they would only do this on satisfactory arrangements being entered into with substantial guarantees; but to carry out these initial works, and for the general purposes of the Company, they required further capital. Therefore they had decided upon the creation of 50,000 additional ordinary shares of £1 each, of which only 25,000 would be issued at the present time, and 25,000 more deferred shares. They would be offered to the present shareholders—the ordinary shares at £5 per share and the deferred shares at 1s. each.

THE OUTLOOK.

Before moving the adoption of the report and accounts, the Chairman said: We look forward to the coming year with the utmost confidence for a realization of our hopes. These are stronger than ever, because of the invaluable experience we have gained and the progress made in perfecting the system which will effect an entire revolution in a state of affairs that has existed far too long, not only to the detriment of the health and well-being of the community generally, but which has been attended hitherto with such a wanton waste of most valuable products. For years and years, millions upon millions sterling have been sacrificed and literally blown into the air through ignorance of the best method of the economic use of coal. To demonstrate this was the object for which the Company was formed; and as its operations are not restricted to a limited area, but are world-wide and practically illimitable, it will be our earnest endeavour to secure some of this hitherto wasted wealth for the benefit of Coalite Limited. I propose to ask Professor Lewes to give you some observations in regard to our process.

Mr. F. R. Pelly seconded the motion.

Professor Lewes on the Situation.

Professor Vivian B. Lewes: I do not propose to occupy your time this morning by giving a long speech upon the merits of coalite and the wonderful bye-products that we get during its distillation. What I do think is of the utmost importance is that you should grasp in your own minds the enormous progress which has been made during the last eighteen months, and which has rendered your position and your property so much more valuable to-day than it was at the time this parent Company was formed. Your financial outlook now, I may say, is practically unique. Now, what has this progress been? There is not the slightest doubt that one of the things most needed in the world was a means by which we could purify the atmosphere of London, Manchester, and the other large towns, which has become a disgrace to civilization. Coalite showed itself as perhaps the most promising method of doing this. When Mr. Parker succeeded in devising a method for making the fuel, it was then also found that the bye-products far and away excelled anything the mind had ever dreamed of. When you had this Syndicate floating the British Coalite Company, the process was looked upon as a going concern: and it was a going concern. Coalite was being made, and the moment that the British Coalite Company came into existence, it was able to put up large plants at Wednesfield and at Barking for making coalite. In the early working of these plants, however, facts were discovered which so widened the horizon of possibility that it was at once seen to be necessary to follow upon the lines indicated by experiment; and what really has been done is so to shorten the period of carbonization as to introduce economies into the process which cannot be touched by any other—enabling the Company to make coal gas on an area far smaller than is possible by any other known process, and at the same time to bring down the carbonizing period to the shortest possible limit. This is a work that has taken a certain amount of time; and though I have watched the inception, and been responsible for the growth, of a good many new processes, I have never yet seen such a year's work as has been done by the British Coalite Company in improving and bringing forward their process.

PUTTING RIGHT A MISCONCEPTION.

Unfortunately, at the recent meeting of the British Coalite Company, there arose a slight misconception in the minds of some present upon certain points; and I should very much like you to give me a couple of minutes in order that I may put that misconception right. It was stated by the Chairman of that Company that during the working of the plant at Wednesfield such improvements had shown themselves that the Directors felt it would not be right for them to go on multiplying the plant indefinitely without first finding out the real value and the promise of the new experiments. Had they gone on multiplying the plants indefinitely at Barking, as many seemed to have expected them to do, under those conditions, the plants would probably have had to be scrapped in order to make way for newer plants which should give a full economic value. The Chairman meant exactly what he said; but Mr. Harry Fisher, of Sheffield, rather argued, from the speech of the Chairman, that this early plant had, in fact, already been scrapped. Now, there has been no scrapping of any plant, either at Wednesfield

or at Barking. In the photographs we have here, you will see one of the original plants—the one that was erected at Wednesfield*—and also the original plant that was put up at Barking. The former of these was worked in the early part of this year, the other not quite so soon, because there was some trouble with the foundations. These plants are working at the present moment. They are dropping some 36 tons of coalite each per diem; and they are a very lively scrap-heap indeed, I assure you.

MODIFYING THE CARBONIZING PROCESS.

Now, that being the first point—that there has been really no scrapping of this kind going on—let us see what the second point is. When you had these plants erected, they were big flat stills, which took some eight or ten hours for the carbonization to be completed. It was very soon seen that the coalite as it was produced was so excellent a non-conductor of heat that the heat could not quickly get from the outer chamber into the core of the material in the retort; and it was seen that if you could reduce the thickness of the coalite which the heat had to traverse, you could enormously expedite the process. The idea arose of using tubes instead of flat retorts; and Mr. Thomas Parker found he reduced the period of carbonization from eight hours or ten hours down to four hours. These tubes were found to give a certain amount of trouble; and the idea arose of casting them into one solid retort, with twelve tubes practically contained in the mass of metal, and the moment that was done you had the period of carbonization reduced to about three-and-a-quarter hours. The mass of metal holding the heat conducted it evenly all round the column of fuel; and there was brought about practically one of the greatest improvements that could be imagined. In doing this, some trouble was experienced in getting the retorts cast by manufacturers. There was a certain amount of difficulty in casting so big a block of metal, weighing, as it did, something over 2 tons, and at the same time getting these tubes, which were part and parcel of the improvements, absolutely in the centre. A number of attempts to manufacture them were made by outside foundries; and to get over the difficulty, Mr. Parker, who is an absolute past-master in foundry work, and knows more about iron-founding than any man who ever came from Sheffield or anywhere else, boldly tackled the situation by erecting a foundry at Wednesfield.

THE LIFE OF THE RETORTS.

That brings me to the second misconception that arose the other day at our meeting. When it was mentioned that a foundry had been started at Wednesfield for the making of these tubes, it was pointed out by some critics present that the only reason that could have influenced the putting up of the foundry was that the retorts were so short-lived that you dared not go to the trade for them in the ordinary way. You made them for yourselves, so that the life of the retort should not really be noticed. Well, no greater mistake than this was ever made. The foundry was erected merely to get over a difficulty which outside founders did not seem either to be able to overcome or to care to take the trouble of so doing. In the future history of coalite, the Wednesfield foundry will show itself to be one of the strongest keys to the position. It was found that, not only could perfect castings of the kind we wanted be made, not only could the interior of the tubes be guaranteed to be absolutely true, as we wanted them, but that we could make them for half the price, and we could rely upon delivery. It has been really the possibility of making the retorts for yourselves which has enabled the British Coalite Company to get so rapidly forward in erecting their large plant down at Plymouth—a plant which will be working by the middle or the end of January, but which if you had had to get the retorts from outside sources would not have been working for another six or seven months.

THE VALUE OF THE PROCESS.

The results of the improvements which have been introduced have been to give you an apparatus of which I do not know the equal. For the making of a given volume of gas it occupies less space, it occupies a less time, and it uses less fuel in the carbonizing than any other apparatus that I know of, including the Dessau or vertical retorts, which are the latest thing now in Continental gas manufacture. These points are of the greatest importance, and, as I say, make your property of simply enormous value. We have had experts from practically every country in Europe coming to see the retorts which are worked at Wednesfield; and in every case they have had nothing but praise for the system. The process is absolutely the right one. There is not the least scientific doubt as to the correctness of it; and now that the mechanical details are overcome, the process ought indeed to have a brilliant future. What I wish especially to impress upon your minds is a point which the Chairman made just now—namely, that you are in a position that one deal would not only clear off the whole financial horizon, but would put you in possession of an enormous property. From my own personal knowledge, there are negotiations going on with half the European countries on one point or another. The fuel question at this moment is in an extremely interesting condition. Everywhere the crusade against smoke is breaking out. Everywhere is being felt the absolute madness of wasting millions of money for the pollution of the atmosphere. They are more keenly alive to that abroad than we are here; and I feel quite certain that before another year has passed you will realize how enormous a property it is that you possess.

After a short discussion, the report was adopted, and the increase in capital was sanctioned.

* Two views of the works at Wednesfield appear on p. 827 of to-day's issue.

Lincoln Water Supply.—In the "JOURNAL" a few weeks ago, we recorded the commencement of a new scheme of water supply for Lincoln, parliamentary powers for which have lately been obtained by the Corporation. We learn that two of the contracts have been let—one to Messrs. A. C. Potter and Co., for £7768 11s. 8d.; the other to the New England Boring Company, Limited, for £42 16s. The Corporation have decided to apply to the Local Government Board for sanction to a loan of £60,000 for water-works purposes.

WOODALL-DUCKHAM VERTICAL RETORTS FOR BURNLEY.

The Gas Committee of the Burnley Town Council, having lately considered a report on the subject by the Gas Engineer (Mr. J. P. Leather)—which is reproduced *in extenso* on p. 825 of this issue—recommended the installation at the gas-works of nine settings of vertical retorts on the Woodall-Duckham system, at an estimated cost of £10,800 (in lieu of inclined retorts previously authorized), subject to the patentees entering into an agreement for the proper performance of the work. The matter was duly brought before the General Purposes Committee, who decided to report to the Council in favour of the adoption of the recommendation, subject to the Town Clerk being satisfied that the sanction of the Local Government Board, dated January, 1906, to a loan of £20,060, for extensions at the gas-works covered the cost of the works now proposed, or, in the event of the Town Clerk not being so satisfied, subject to an effective sanction of the Local Government Board being obtained to a loan to meet the cost of the works. The recommendation, therefore, duly came up for consideration at this month's meeting of the Council, when, after some discussion, it was adopted.

Mr. Lees moved that the minute be referred back, and that the Gas Committee be recommended to put down one experimental set of vertical retorts for the present. He said he was not opposed to the introduction of labour-saving appliances. He took his stand on the ground that vertical retorts had not been tested sufficiently to warrant the Committee in asking the Council to sanction the expenditure. The invention dated back only to 1903. Prior to that, vertical retorts had been in use in Germany; but they had never been able to get what, from the English standpoint, was a satisfactory illuminating power of gas from the German system of vertical retorts. They had been able to secure an illuminating power of 14 candles in some tests; but the production of gas per ton of coal used had gone down considerably. The Nottingham Gas Committee sent over to Germany a large quantity of the coal they ordinarily used in their own retorts with some experts to watch the results. They got variable returns, and found there was a reduced make of gas. Instead of 11,000 cubic feet, they only obtained 10,500 cubic feet, not of 18-candle power, but of 13 or 14 candle power. They were told the English version of the German retorts was a great improvement. There might be a little mechanical improvement; but the results were unsatisfactory. As they sought to improve the illuminating power of the gas, they decreased the output per ton of coal carbonized. Liverpool had discontinued experiments with vertical retorts, because it was shown they could not obtain gas of anything but a very low illuminating power. They secured sanction to a loan of £20,000, on the ground that they would produce 2,160,000 cubic feet of gas per day. They were now asked to exhaust their borrowing powers, and only half fill the retort-house, while they would be able to produce only 1,350,000 cubic feet of gas.

Mr. Hargreaves remarked that there must be something materially wrong, after reading the report of the Gas Manager, and then hearing Mr. Lees.

Mr. Irving said that, without professing to know the merits of the vertical and inclined retorts, when they faced the fact that throughout the country not one gas-works was working on the principle, the appeal for an experiment ought to be irresistible. At other places they had not gone beyond experiment.

Mr. Clough could not understand why reference should be made to the German retorts. The Gas Committee had not recommended German retorts. He and the Chairman saw the retorts two years ago; but they were not then satisfied. They looked at them from a mechanical point of view; and they left the Gas Engineer to satisfy himself that they would be able to make gas at an economical rate. Since then there had been a wonderful improvement; and, as far as they could see, almost finality. To say that they could not make a high candle power gas was altogether different from what Mr. Lees was told in the Committee. They could get proper candle power without enriching with cannel or oil; they could get 10 per cent. more by this system than by inclined retorts. They could make gas economically; and the way to do it was to put on a set such as a gang of men could work. They would get better tar and coke; they would make no water gas; and if only because there was no smoke or dust, this would warrant them in putting down vertical retorts. Both the charging and drawing was done by mechanical means; and they would get rid of the trouble they had had with the men at the works.

Alderman Emmott, the Chairman of the Gas Committee, said Mr. Lees had left out the main item of his objection to these retorts—and that was the reduction of workmen. He had not shown anything against the retorts; and the Corporation would be justified in going on with the work. In acknowledging that he was prepared to put in one set, he was nearly bound to acknowledge they were going to be a success. The objection to putting in one set of four retorts was that they could not regulate the working of one set. They could regulate nine sets; and the Engineer was thoroughly satisfied they would be a success. The retorts at Liverpool were put in on the old principle. They created water gas. From the Burnley standpoint, the retorts at Liverpool were not a failure; but the Liverpool Gas Company were under obligation to supply a 20-candle gas. The gas they made at Liverpool on the experimental set was equal to what was made at Burnley with ordinary coal. As to nobody else having tried these retorts, if Burnley waited till everybody had tried them, they would be waiting for somebody else's patent. No doubt, in ten years somebody would be trying to improve on the present method; but the Corporation could not wait ten years. The Committee were satisfied that, by putting in these vertical retorts, the saving would be such that it would pay the Corporation exceedingly well. When they put in inclined retorts, they were new. No other town in the country had made them a success up to the time Burnley took them up; but they had been a thorough success in Burnley. When someone brought out a patent which was far better than the one they had, they were justified in going in for it. The Gas Engineer showed clearly that they were going to have a tremendous saving by putting in nine sets. The saving would be at least £12 a day; but they had an idea that this estimate was low, and that the saving would be considerably more. The Gas

Engineer was an expert on gas making; and his reputation was at stake. Mr. Lees' main objection was to the reduction of men; but he (the speaker) did not think there would be a single man thrown out. Besides, they ought not to stop at improvements because they would take less labour. If the same thing had obtained in the old hand-loom days, there would have been no steam-looms now. Introducing machinery to do the work had not done away with labour; it had brought more work for the workers.

The minutes were then put and carried.

BRADFORD STREET LIGHTING EXPERIMENT.

It may be called to mind that a short time ago it was arranged to carry out an experiment in street lighting at Bradford, for the purpose of ascertaining whether gas or electricity was the best method of illumination; a certain space being placed at the disposal of the Gas Committee, and another being allotted to the Electricity Committee.

Mr. Charles Wood, the Gas Engineer, has lately submitted to the members of his Committee a report on the subject. In carrying out the instructions of the Committee, he says, an endeavour has been made to secure as good and even an illumination as possible at moderate cost. High-pressure lighting, though giving twice as much light per cubic foot of gas used, entails considerable outlay on compressing plant, special mains, and maintenance. High-pressure lamps of 1000 or 2000 candle power, which must be 20 or 25 feet high, do not give such an equal distribution of light as a larger number of smaller units placed closer together. In the portion of Manningham Lane selected for the experiment, the Gas Department have, in about 703 yards, 75 lamps in 19 spaces between tramway poles; the electrical portion measuring 707 yards.

The lamps are of the ordinary pattern, fitted with three new type Bray burners, which average 3·84 cubic feet of gas per hour; the light being 11 ft. 6 in. above ground. It was at first intended to place them about 24 yards apart, or three lamps to every two spaces between the tramway poles; but in order to show a fairer comparison with the electric lamps, as well as to arrange the lamps so that alternate ones can be removed after the experiment is completed, it was decided to place two to every tramway pole space, or about 19 yards apart. All the burners are lighted up to eleven p.m., giving, according to the present scale, 1857 hours per annum. At eleven p.m., half the lamps are extinguished, and in the others one burner is left until daylight—1933 hours per annum.

The average cost of each lamp erected complete is £4 19s.; and the gas used by the 75 lamps per annum is 1,886,500 cubic feet, or 25,153 cubic feet each. The estimated cost of maintenance is £91 2s. 1d., or £1 4s. 4d. per lamp. Last year 1s. 5d. per 1000 cubic feet was received from the Finance Committee for the gas used in the lamps. At this rate, the gas is worth £133 12s. 6d., or £1 15s. 7d. per lamp, bringing the total annual cost to £224 14s. 7d., or £2 19s. 11d. per lamp, or 6s. 4¾d. per yard of street. Taking gas at the selling price of 2s. 1d., less 12½ per cent., the total cost of the 75 lamps would be £263 1s., or £3 10s. 1d.—7s. 5¾d. per yard. At 1s. per 1000 cubic feet, the total cost would be £185 8s. 7d., or £2 9s. 5d. each—5s. 3¼d. per yard.

Mr. Wood submits that, in comparing the two systems, the values of both gas and electricity should be taken at the price charged to other lighting consumers, or should be taken at actual cost in both cases. Gas could be profitably supplied at much lower rates in places like Manningham Lane or other main streets and in back streets and in outlying scattered districts where many miles of mains have been laid for lamps only. In these calculations, the prices charged for gas are averaged over the whole city area. If 37 of the 75 gas-lamps are removed, the annual cost (with gas at 1s. 5d.) will be £123 2s. 3d., or £3 4s. 9d. per lamp, or 3s. 6d. per yard of street; and the street will then be well lighted. Many of the gas-lamps in main streets, it is pointed out, help to light the side streets. In the gas-lighting part of Manningham Lane, every one of the 20 side streets has a lamp at the corner. In the electricity portion, out of 19 side streets six are not illuminated at all by the arc lamps, and additional gas-lamps will be necessary.

The advantages claimed by Mr. Wood are the absolute steadiness of the gas-lamps, and their superior penetrative power in fog; no shadows across the causeways; no dark places in the roadway; no dangerous wires over the causeways; each lamp an independent unit; and the reliability of gas lighting.

British Coal for Bavarian Gas-Works.—According to a special telegram sent from Frankfort to the "Financial News," owing to the attitude of the Prussian Government, in its capacity as colliery owner, in declining to make any reduction to large German industrial concerns, the conductors of the Bavarian gas-works have decided to obtain their entire supply of coal, amounting to about 500,000 tons yearly, from British collieries.

Workmen's Compensation Rates.—It has been announced that the leading Insurance Companies will increase their rates on workmen's compensation risks after the 1st prox. from 10 to 25 per cent., according to the nature of the hazard. It has been recognized for some time that the rates were too low to be profitable; and a beginning will be made with the "heavy risks." Among the trades to be affected are builders, engineers, lead workers, painters, briquette makers, and woodworkers.

Illegal Employment of Trade Union Funds.—A delegate meeting was held last Thursday night at Porth, Rhondda, at which delegates attended representing 24 Conservative clubs in Rhondda South and East Glamorgan parliamentary constituencies, represented respectively by Mr. W. Abraham, Mr. W. Brace, and Sir Alfred Thomas; and it was unanimously decided, in view of the recent judgment in the Amalgamated Society of Railway Servants' case with reference to the parliamentary levy, to fight a test case on the same issue in regard to the Miners' Federation of Great Britain. The constituencies represented contain 40,000 miners; and it was resolved to proceed to recover the parliamentary levies from Conservative miners during the last five years.

AMMANFORD LIGHTING QUESTION.

Adoption of an Electric Light Scheme.

A Special Meeting of the Ammanford Urban District Council was held on Monday of last week to deal with a report of the Roads Committee, which was to the effect that, having regard to the Bill now being promoted by the Gas Company, the heads of an agreement with Mr. William Herbert for an electric lighting scheme should be submitted for consideration by the Council.

The proceedings opened with a plea for the Gas Company by Colonel Morris, who asked whether they as a Council were in a position to enter into an agreement without acting unfairly to the Gas Company. They gave a concession to the Gas Company, who came there and spent a large amount of money on retorts, mains, &c.; and were the Council justified in throwing aside all this, and treating for electric light? He maintained that they had no legal or moral leg to stand upon. Rather, he thought, it was their plain duty to come to the best terms they could with the Gas Company. They were not yet off with the old love, and should not start with a new one. He reiterated that they had no right to enter into negotiations with anyone, because the question of gas *versus* electric light had been already decided. Were they aware of the cost of electricity as compared with gas? He said they would lose hundreds of pounds if Mr. Herbert charged 5d. per unit for electric power. So far as he knew, the situation with the Gas Company had not changed one iota.

Mr. Roblings pointed out that electric light was now cheaper than gas; and Colonel Morris retorted that he was surprised to hear it. Mr. Roblings, continuing, said he was afraid Colonel Morris had held the position of "Rip Van Winkle" with regard to electric light the last few years. Since the improved and new type of lamp had come into use, there was three times the amount of light given at less cost. The whole aspect was entirely changed. In fact, the proposed arrangement with Mr. Herbert was for a light to be supplied far cheaper than anything they could get in the way of gas.

Mr. Hewlett felt he must endorse every word that Colonel Morris had said. He did not approve of the manner in which the Gas Company had been treated. The latter came there, set up a plant, spent a large sum of money—somebody's money; and no doubt these people were looking for a return of some sort—misguided shareholders perhaps. He was not personally interested in any way in the concern; but he wished to protest against the action of the Council with regard to the Gas Company, as he thought it absolutely wrong. The Council were not giving justice to the Company; and he objected to their entering into another scheme, as the Council had practically agreed already, and given a concession to the gas people. It was wrong; and he had no hesitation in saying so. He thought the last letter read at the Council from the Solicitor of the Gas Company agreed to everything that had been asked for; and then they (the Council) turned round, and went against them. He thought if the Parliamentary Bill went before any Committee of the Lords or Commons, and these facts came out, they would go very much in favour of the Gas Company.

Mr. Roblings was surprised at the opposition raised, and defended the action of the Council. He said that there had only been a draft agreement, and the Council had sent communications which had been addressed to one Company, and replies were received from another. The Council never got recognition of the agreement, and, therefore, took advantage of one of the clauses to give three months' notice to terminate. The advice of Counsel had been taken; and they were perfectly safe now in the course they proposed to adopt. The Council were in a legal position, at any rate so far as the Gas Company were concerned, and could leave their mains in the road without fear of interference. The Council had been threatened by these people to break off negotiations, and why should they, as a Council, submit to that? Besides, they had brought men and broken up the roads; and the local Manager of the Gas Company had flouted telegrams in the face of the Council's officials as to what he should do. They, as a Council, had the rights of the people to maintain, and no further consideration at all should be given to the gas people. The Council had definite information from people in the gas world concerning the Company which was far from palatable to them; and he repeated that the Council were fully justified in breaking off negotiations. The Gas Company certainly had not been dealt harshly with by Ammanford. The Council must maintain their rights, and not allow these people to go scot free and do as they pleased with the roads.

Mr. Evans agreed with Mr. Roblings, and was surprised at Colonel Morris supporting the Gas Company, who had dealt with the Council in a most shabby manner. The duty of the Council was the care of the Ammanford ratepayers; and they had both moral and legal legs to stand upon. There was nothing to prevent the Gas Company from providing private consumers with gas; all the Council were concerned over now was the discussion of street lighting. If the Colonel could prove that gas was cheaper, they would go in for it.

Colonel Morris said he thought he had been attacked; but he hoped he did his best to protect the public as much as Mr. Roblings. They, as a Council, had been discussing this matter now since—not last week, but the beginning of 1905, and he knew all about it. He should like to hear the Counsel's opinion Mr. Roblings referred to. Had the Gas Company been the biggest scamps on earth, and the Council entered into an agreement, it should be carried out. But the whole thing had been upset altogether; and their Surveyor had driven the Gas Company's men from working in the roads.

The draft agreement provided for lanterns of a value of 12s. 6d. each. The lamps would be 50-candle power, and the charge £2 10s. each for the first 100 lamps, £2 for the second, and at the rate of £1 15s. for upwards of 200 lamps. The Council would have the option of purchasing the undertaking at the end of 7, 14, or 21 years, at a price to be agreed upon, failing which there should be arbitration; but no goodwill would be paid. There was to be a deposit of £500 as surety for carrying out the contract for laying down the installation, with full liberty of access to the works by the Council. Private consumers would be charged 5d. per B.T.U., and 3d. for purposes of power. All streets to be lighted by Aug. 1 next. There were 8½ miles of roads to

be lit; and the distances between lamps varied from 55 to 80 yards. The electric supply would be for 1800 hours per year. The wires would be overhead; and the plant would be driven by suction gas. It was proposed to have 160 lamps at first, and 192 lamps when all the roads were lit. It was the intention of Mr. Herbert to apply for a Provisional Order within twelve months.

Mr. Roblings proposed agreement with these terms; and after a lot more discussion, this was carried by ten votes to two—the dissentients being Colonel Morris and Mr. Hewlett.

COAL MINES (EIGHT HOURS) BILL.

Objections of Large Consumers—The Bill in the Lords.

On Monday last week, a Meeting of City men and delegates from all parts of the country, convened by the Coal Consumers' Defence League, was held at the Cannon Street Hotel, to protest against the Coal Mines (Eight Hours) Bill. Lord NEWTON (President of the League) presided.

The SECRETARY (Mr. G. E. Raine) read a letter from Lord Cromer, who, after expressing regret at his inability to attend, added: "I entirely sympathize with the views of those who think that the Eight Hours Bill should not be passed into law." Sir Hugh Bell wrote that he would oppose the Bill to the bitter end.

The CHAIRMAN, in opening the proceedings, said that the real, though carefully concealed, object of the Bill was to reduce the output of coal, and thereby to send up the rate of wages.

Mr. J. F. MASON, M.P., representing the Iron and Steel Trades, moved a resolution protesting against the passing of the Bill, and expressing the opinion that it would involve a substantial increase in the price of coal, and would become "a source of the gravest danger to the industrial and social well-being of the country." He characterized the measure as a selfish attempt on the part of the aristocracy of labour to get for itself further advantages than it now had at the expense of those poorer workers in other industries who were paid less wages.

Lord CLAUD HAMILTON, on behalf of the Railway Companies, said they looked forward with the greatest concern to a certain increase in the price of coal, which, if the Bill passed, must take place. The railways consumed 16,101,000 tons of coal per annum. An advance in price of 1s. per ton on this quantity meant an additional £805,000, and of 2s. per ton an additional £1,610,000. If they raised the price of coal, the Railway Companies would be forced, against their instincts and in contradiction of their traditional policy, to make further economies, which could only be in the direction of reducing the men's wages, and the dismissal of every man who could be spared. The measure was not the outcome of a genuine movement on behalf of the miners, but was the deliberate action of so-called Labour leaders.

Mr. CHARLES CHARLETON, Chairman of the London Chamber of Commerce, said the whole of the Chambers of Commerce of the country were opposed to the measure. In his own trade—the cement trade—it would jeopardize to a great extent the wage-earning power of an enormous number of men.

Mr. H. E. JONES said that, in addressing the meeting, he represented an Association—the Gas Companies' Protection Association—which included nearly the whole of the gas undertakings in the kingdom, who were unanimously of opinion that the effect of the Bill would be to shorten the supply of coal, and therefore lead to higher prices. They were large coal consumers; London alone taking 3½ million tons. Invariably in the past, shortage had led to higher prices and inferior quality. The attempt to control the right of a labourer to work as long as he chose, was as objectionable as it was novel. He (the speaker) would fight to the last in defence of his own right to work as long as possible. It was, indeed, a working man's question—the whole of the working men in the kingdom were to be taxed to give more leisure to a class already taking undue holidays. If the smallest increase that had been foretold—viz., 1s. 6d. per ton—came about, it would increase the cost of gas above 2d. per 1000 cubic feet. Nearly four-fifths of some gas companies' consumers were working people or needy traders, who could not afford the extra tax.

The resolution was carried with one dissentient.

An emergency meeting of the Chambers of Commerce of the United Kingdom was held on the same day at the Hôtel Métropole. On the motion of Mr. A. J. Hobson (President of the Sheffield Chamber), seconded by Mr. Charleton, the following resolution was unanimously passed: "That this emergency meeting of delegates from the Chambers of Commerce of the United Kingdom desires to record its emphatic protest that, in spite of the repeated warnings of experts and the dissent of the whole commercial community of this country, the Government have proceeded in pressing forward the Mines (Eight Hours) Bill; that the miners, through their powerful organization, can protect themselves, and make arrangements as to hours of work sufficiently elastic to take into consideration the varying conditions of the different coalfields which a rigid Act of Parliament applicable to all parts of the country cannot do, and the safety of the men from accident is likely to be decreased by the Bill; that, under these circumstances, the Bill sets a precedent which other branches of organized labour will claim to follow, and is a regrettable restriction of the liberty of the individual; that the reduction of the hours of labour is intended to cause loss of production and a consequent rise in price, which will adversely affect every manufacturer, increase the cost of living to all classes of the community, and tend to lessen employment; and that the measure is an act of protection at the expense of our own traders in favour of such foreign competitors as obtain their coal from sources not subject thereto. This meeting, therefore, voicing as it does the practically unanimous protest of the manufacturers, shipowners, and private consumers of this country, turns with confidence to the House of Lords, and trusts that their Lordships will throw out the Bill." It was agreed to send a copy of the resolution to Lord Lansdowne.

Parliamentary Proceedings.

The Bill having been passed by the House of Commons and sent to the House of Lords on Monday last week, it came up for second reading on Tuesday. It was in charge of Lord Beauchamp, who explained its main features, and expressed his gratification that it was not likely to give rise to much controversy. In accordance with his expressed intention, Lord Newton moved that the Bill be read a second time that day three months. He laid special emphasis on the fact that a new burden of dearer coal would be laid upon the consumers by the Bill, which had the support of a Free Trade Government; and he quoted evidence to show that the miners were not generally in favour of the measure. In the course of the discussion which followed, Lord Cromer condemned the Bill as equally objectionable to Free Trader and Tariff Reformer, and contended that those who would suffer under it would be the working classes. Lord Lansdowne, referring to the argument that the Bill would lead to an increase in the price of coal, said he was not much concerned with that, so far as the colliery owner was concerned, for he could take care of himself. What they had to consider was the consumer; and to sanction anything which would increase the price to him was about as dangerous a step as any Government could take. It was said that the effect of the Bill would only be a temporary matter; but he asked the House to consider what a temporary embarrassment of the country's industry might mean with the unemployed walking about the streets, and also what it would mean to humble people who bought their coal almost by the pound. He accepted the views of the Government that the results which some people apprehended would not come to pass; and, looking forward to amendments being made in Committee, he could not oppose the second reading of the Bill. Lord Knaresborough, however, strongly opposed it; holding that the effect of the Bill would be to restrict the production of coal and raise the price. Lord Crawford expressed himself somewhat to the same purport. Lord Plymouth, while supporting the second reading, objected to the too rigid application of the Bill. Lord Londonderry said that, associated with the coal trade as he was, he must offer the strongest opposition to the principle of the Bill, which he considered was extremely dangerous. Lord Durham also strongly opposed the Bill, and said he should vote against it, as he considered it would not be a boon but a curse to the miners. On a division, the Bill was read a second time by 121 against 44.

The Bill came up for consideration on Thursday, when Lord Newton moved to leave out the words in clause 7 postponing the application of the Act for an extra six months (to Jan. 1, 1910) as regards mines in the counties of Northumberland and Durham. He said he objected to this preferential treatment being given to these two great colliery districts, and submitted that the most practicable way of dealing with the difficulty was to extend to Jan. 1, 1910, the period at which the Act was to come into operation. Lord Beauchamp said that either the Government must withdraw the concession which had been made to Northumberland and Durham, which would be an ungracious step, or they must make the concession extend to the other coal districts throughout the country. If there was any rise in prices, it would be much harder on the consumer if it took place on the 1st of January than on the 1st of July. In any case, the Government did not propose to divide the House on the question, although their lordships must not regard this as meaning that they were finally prepared to accept this date. After some discussion, the amendment was carried without a division. Lord Avebury thereupon proposed to amend the clause in such a way that the Act should come into operation throughout the country on July 1, 1910. Lord Beauchamp said this date was so remote that the Government could not accept the amendment. It was, however, carried without a division.

The Bill as amended by the Lords was considered in the House of Commons on Friday. One of the amendments, which had been adopted on the motion of Lord St. Aldwyn, excluded both windings for an indefinite time from the statutory eight-hour day; and the Home Secretary (Mr. Gladstone) expressed regret that the other House had altered the Bill in this manner. The Government, however, agreed to the amendment, but with the greatest reluctance, and in the hope that its acceptance would stimulate the mine-owners to co-operate loyally in carrying out the measure. Mr. Keir Hardie was indignant at the action of the Government, and accused them of acquiescing in the mutilation of the Bill. After some discussion, the amendment was accepted. Other amendments made by the Lords upon which there were animated discussions were those already noticed, deferring the date when the Bill would come into operation until July 1, 1910, and withdrawing from Northumberland and Durham the special extension of six months given in the House of Commons to enable colliery proprietors in these counties to effect the necessary rearrangements. Mr. Gladstone said he proposed to disagree with these amendments, and asked the House to reinsert the date standing in the Bill when they read it the third time (July 1, 1909). It had been suggested that, as a compromise, they should accept Jan. 1, 1910, as the date; but the Government were not prepared to take the responsibility of bringing the Bill into operation all over the country in mid-winter. Mr. Balfour said he would support the Government on the understanding that they took the full responsibility for the time arrangements. Thereupon the Lords' proposals were rejected. The Bill as amended was subsequently considered in the Upper House, where a brisk discussion took place on the question of the date on which the Bill is to come into operation. Lord Lansdowne said he was not prepared to insist upon the prolongation of the date until July 1, 1910, but he thought the amendment excluding the two windings from the statutory day was of vital importance. In the result, the Bill was read the third time and passed; and yesterday it received the Royal Assent.

Manila Water Supply.—According to a recent Consular report, the water-works for Manila, which are now under construction, should be completed by next July. The scheme provides for a supply by gravitation, and includes a masonry dam, a steel pipe-line and a masonry conduit (respectively about 10½ and 4½ miles in length), receiving and distributing reservoirs, gates, and gatehouses, &c. The cost is estimated at upwards of £200,000.

REINSTATEMENT OF PAVING IN WESTMINSTER.

At the Meeting of the Westminster City Council last Thursday, the Works Committee reported that a conference, convened at the instance of the Gaslight and Coke Company, had been held between representatives of the Council, the Company, the London Hydraulic Power Company, the Westminster Electric Supply Corporation, and the Charing Cross, West End, and City Electricity Supply Company, with the view of arriving at a definite understanding on certain questions in dispute in regard to the charges for the reinstatement of pavements after trenches have been made. A number of points were under consideration, among them being the question of the use of steam-rollers. The Companies considered that the use of a steam-roller on every small opening, especially on cross-openings, was unnecessary, and also that the charge made in respect of this work was very high. The Committee replied that the reinstatement of trenches in macadamized roads was carried out under contract, and, in accordance with their instructions, the specification provided for steam-rolling, but only in such cases as the Council might require. It was suggested by the Companies that the use of a steam-roller on every small road-repair made the reinstatement very costly. In practice, however, said the Committee, the contractor did not steam-roll every small trench, but waited until there were a number, when they were all rolled at one time. Another point was the burying of mains in concrete. This was considered by the Companies to be, in effect, a structural interference with their pipes, as these could not be got at without the almost certain risk of smashing them as well as the concrete. Where the pipes were in the way of the concrete, it was considered that the Council should bear the cost of lowering them, under the Statutes giving them this power. Reference was here made to an instance where the Council substituted pavement on concrete for macadam, and where a gas-pipe, being within a few inches of the surface, and the Company, after notice, declining to lower or divert, it was embedded in the concrete foundation of the paving. The Companies were informed that, in such circumstances, where the level of the street was not altered, the Council could not admit liability to lower or divert an undertaker's pipes. A further point related to vaults. The Companies thought that vaults should not come so near the surface of the footway as to prevent mains being laid; and they suggested that a space of 2 feet should be left. The Committee said the space required by the Council, under the present rules, was 1 ft. 6 in.; and the Companies were informed that in case of vaults already constructed the Council had no power to require alteration in the manner suggested. It was proposed, however, to deal on its merits with every application for the construction of new vaults, with a view, if possible, to the wishes of the Companies being fulfilled. The report was adopted except in respect of two matters relating to the use of concrete.

Two young women were injured at York last Saturday week by an explosion which ensued upon one of them striking a match to light the gas. They were conveyed to the hospital, badly burned about the arms and face. Some damage was also caused to the building.

GAS PRESSURES IN WANDSWORTH.

At the Meeting of the Wandsworth Borough Council last Wednesday, there was submitted to them by the General Purposes Committee a lengthy report by their Gas Examiner (Mr. H. Wilson Hake) on the subject of the differences in the pressure of gas supplied by the local Gas Companies. It was addressed to the Town Clerk in answer to questions contained in a letter received from him. Mr. Hake stated that it was not easy, without detailed explanation, to give a direct answer to the inquiry whether or not the pressures of gas employed were prejudicial to the consumer, and what was the most advantageous pressure, as so much depended upon the point of view. But, taking into consideration present-day conditions, he should say that no pressures recorded should be prejudicial, and that the higher pressure might, under certain circumstances, be advantageous, At the same time, that of the Mitcham and Wimbledon Company (3·7 inches) was approaching a somewhat high limit. In his special report, made at the beginning of the year, the disadvantages of high pressures were pointed out—viz., leakage, and consequent loss of gas to both companies and consumers, together with special disadvantages to the latter. Owing to the steady augmentation in the quantity of gas used both for heating and cooking purposes, as well as for incandescent burners, it was found necessary to meet the extra demand; and in many cases the only way of doing this was by increasing the pressure. The reason for this was that the service-pipes were of small calibre, and could not, without great inconvenience and expense, be relaid. The same remark would apply to some of the mains. Gas-fitters were aware that better types of taps and joints were necessary with higher pressures, in order to resist the leakage which might otherwise occur; and it was therefore in the hands of the consumer to prevent this by seeing that his fittings were adapted to the higher pressures. He (Mr. Hake) had been told that in America very much higher pressures were used than were customary in England, and without disadvantage to the consumers, who employed governors. Mr. Hake went on to point out that in the London County Council's returns for the weeks ending Nov. 14 and 21 last the pressure of gas supplied by the Gaslight and Coke Company was 3·3 inches on Nov. 12 and 3·7 inches on Nov. 19; while the pressure employed by the Commercial Gas Company on Nov. 11 was 4·1 inches. On inquiry, he found that these pressures were not considered excessive, in view of present day requirements. Obviously, with old-fashioned and possibly long-used fittings a pressure of nearly 4 inches would be disadvantageous to the consumer, inasmuch as leakage would almost certainly result. The pressure employed by the Mitcham and Wimbledon Gas Company had always been rather high—much higher than that of the Wandsworth and Putney Company; but whether this was due to the long distances the gas was sent, or to the increased demand for gas and the inadequacy of the mains and service-pipes, he was unable to say.

The Elloughton and Brough Water Company, Limited, has been registered with a capital of £5000, in £5 shares, to acquire from Mr. H. B. Harrison-Broadley, M.P., Mr. A. J. Atkinson, and Mr. G. R. Ouston, the Brough Water Order, 1908.

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 814.

Issued.	Share.	When ex. Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	18–18½	..	5 8 1
268,324	10	,,	7	Do. 7 p.c.	12⅜–13⅜	..	5 5 8
310,000	Stk.	July 15	4	Do. 4 p.c. Deb.	100–102	..	3 18 5
200,000	5	Oct. 29	6½	Bombay, Ltd.	5⅝–5⅞	..	5 10 8
40,000	5	,,	6½	Do. New, £4 paid	3¼–4¼	..	6 6 1
50,000	10	Aug. 27	14	Bourne- mouth Gas and Water — 10 p.c.	29–30	..	4 13 4
51,810	10	,,	7	Bourne- mouth Gas and Water — B 7 p.c.	16½–17	..	4 2 4
53,200	10	,,	6	Bourne- mouth Gas and Water — Pref. 6 p.c.	15½–16½	..	3 13 10
380,000	Stk.	Aug. 13	12½	Brentford Consolidated	245–248	..	5 0 10
300,000	,,	,,	9⅜	Do. New	187–190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
206,250	,,	Dec. 11	4	Do. 4 p.c. Deb.	100–102*	..	3 18 5
220,000	Stk.	Sep. 11	10⅝	Brighton & Hove Orig.	208–211	..	5 1 10
246,320	,,	,,	7½	Do. A. Ord. Stk.	152–155	..	5 0 0
460,000	20	Oct. 15	10	British	42½–43½	..	4 11 11
109,000	Stk.	Aug. 27	6	Bromley, Ord. 5 p.c.	114–116	..	5 3 5
165,700	,,	,,	4½	Do. do. 3½ p.c.	84–86	..	5 4 8
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	11¼–11⅝	..	5 19 2
250,000	Stk.	Dec. 11	4	Do. 4 p.c. Deb.	92–94*	..	4 5 1
150,000	20	July 15	7½	Cagliari, Ltd.	25½–26½	..	5 9 5
100,000	10	—	—	Cape Town & Dis., Ltd.	4⅜–5⅜	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	4⅜–5⅜	–⅛	8 3 8
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	47–49	..	6 2 5
100,000	Stk.	Dec. 11	4½	Do. 4½ p.c. Deb. Stk.	78–80	..	5 12 6
157,150	Stk.	Aug. 13	5	Chester 5 p.c. Ord.	109⅝–111⅝	..	4 9 8
1,493,280	Stk.	Aug. 27	5⅝	Commercial 4 p.c Stk.	106–108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103–105	..	4 15 3
475,000	,,	Dec. 11	3	Do. 3 p.c. Deb. Stk.	81–83*	..	3 12 3
800,000	Stk.	,,	6½	Continental Union, Ltd.	105–108*	..	6 0 4
200,000	,,	,,	7	Do. 7 p.c. Pref.	137–140*	..	5 0 0
460,170	Stk.	—	5	Derby Con. Stk.	122–124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	103–105	..	3 16 2
148,995	,,	Sep. 30	5	East Hull 5 p.c. Ord.	98–100	..	5 0 0
486,090	10	July 15	12	European, Ltd.	23½–24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	17½–17⅝	..	5 1 4
15,182,590	Stk.	Aug. 13	4/10/8	Gas- light and Coke — 4 p.c. Ord.	99⅝–100⅜	–⅜	4 10 2
2,600,000	,,	,,	3½	Gas- light and Coke — 3½ p.c. max.	89–90	..	3 17 9
3,799,735	,,	,,	4	Gas- light and Coke — 4 p.c. Con. Pref.	106–107	..	3 14 9
4,193,975	,,	Dec. 11	3	Gas- light and Coke — 3 p.c. Con. Deb.	84½–85½*	+⅛	3 10 2
258,740	Stk.	Sep. 11	4⅝	Hastings & St. L. 3½ p.c.	95–97	..	4 17 11
82,500	,,	,,	6¼	Do. do. 5 p.c.	113–115	..	5 8 8
70,000	10	Oct. 15	11	Hongkong & China. Ltd.	18–18⅝	..	5 18 11
123,500	Stk.	Sep. 11	6⅛	Ilford "A" and "C"	131–133	..	4 17 9
65,780	,,	,,	5	Do. "B"	103–105	..	4 15 3
51,000	,,	June 26	4	Do. 4 p.c. deb.	104–106	..	3 15 6
4,940,000	Stk.	Nov. 13	8	Imperial Continental	180–182	..	4 7 11
473,600	Stk.	Aug. 13	3½	Do. 3½ p.c. Deb. Red.	95–97	..	3 12 2
195,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.	120–122	..	4 18 4
561,000	Stk.	Aug. 27	10	Liverpool United A	226–223	..	4 7 9
718,100	,,	,,	7	Do. B	167–169	+½	4 2 10
306,083	,,	June 26	4	Do. Deb. Stk.	106–108	..	3 14 1
75,000	5	Dec. 11	6	Malta & Medn., Ltd.	4⅝–4⅞*	..	6 3 1
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	100–102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100–102	..	4 8 3
541,920	20	Nov. 13	3½	Monte Video, Ltd.	11½–12	..	5 16 8
1,775,892	Stk.	July 30	4/12/6	Newc'tle & G'tesh'd Con.	109–110	+½	4 4 1
418,462	Stk.	June 26	3½	Do. 3½ p.c. Deb.	92–94	..	3 14 6
15,000	10	Aug. 27	10	North Middlesex 10 p.c.	20–20½	..	4 17 6
55,940	10	,,	7	Do. 7 p.c.	13½–14	..	5 0 0
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	139–141	+1	5 13 6
60,000	5	Sept. 30	8	Ottoman. Ltd.	6⅛–6⅜	..	6 5 6
31,800	53	Aug. 27	13	Portsea Island A	138–140	..	4 18 6
60,000	50	,,	13	Do. B	132–134	..	4 17 0
100,000	50	,,	12	Do. C	122–124	..	4 16 9
114,800	50	,,	10	Do. D and E	104–106	..	4 14 4
398,490	5	Oct. 29	7	Primitiva Ord.	5⅜–6	–⅛	5 16 8
796,980	5	July 30	5	Do. 5 p.c. Pref.	5⅛–5¼	+⅛	4 15 3
488,900	100	Dec. 1	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
1,000,000	10	Oct. 15	8	River Plate Ord.	13–13½	..	5 18 6
312,650	Stk.	June 26	4	Do. 4 p.c. Deb.	94–96	..	4 3 4
250,000	10	Sept. 30	8	San Paulo, Ltd.	14–14½	..	5 12 3
125,000	50	July 1	5	Do. 5 p.c. Deb.	50–51	..	4 18 0
135,000	Stk.	Sept. 11	10	Sheffield A	240–242	..	4 2 8
209,984	,,	,,	10	Do. B	240–242	..	4 2 8
523,500	,,	,,	10	Do. C	240–242	..	4 2 8
70,000	10	Oct. 29	10	South African	13–13⅛	..	7 8 2
6,429,895	Stk.	Aug. 13	5/6/8	South Met., 4 p.c. Ord.	119½–120½	..	4 8 6
1,895,445	,,	July 15	3	Do. 3 p.c. Deb.	85½–86½	..	3 9 4
209 820	Stk	Aug. 31	8	South Shields Con. Stk.	153–155	..	5 3 3
05,000	Stk.	Aug. 13	5/6/8	S'th Suburb'n Ord. 5 p.c.	117–119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	121–123	..	4 1 4
117,058	,,	July 15	5	Do. 5 p.c. Deb. Stk.	124–126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord.	107–109	..	4 11 9
120,000	Stk.	Aug. 13	6¾	Tottenham and Edmonton — A 5 p.c.	134–136	..	4 19 3
398,940	,,	,,	5¼	Tottenham and Edmonton — B 3½ p.c.	106–108	..	4 17 3
149,470	,,	June 26	4	Tottenham and Edmonton — 4 p.c. Deb.	102–104	..	3 16 11
182,380	10	June 12	8	Tuscan, Ltd.	9⅝–9¾	–⅛	8 2 0
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100–101	..	4 19 0
193,742	Stk.	Aug. 27	5	Tynemouth 5 p.c. max.	106–108	..	4 1 7
255,636	Stk.	Aug. 27	6½	Wandsworth and Putney — B 3½ p.c.	128–130	..	5 0 0
79,416	,,	June 26	3	Wandsworth and Putney — 3 p.c. Deb. Stk.	74–76	..	3 18 11
845,872	,,	Aug. 27	5½	West Ham 5 p.c. Ord.	111–113	+5	4 10 9
185,000	,,	,,	5	Do. 5 p.c. Pref.	122–124	..	4 0 8
228,300	,,	June 26	4	Do. 4 p.c. Deb. Stk.	105–107	+1	3 14 9

Prices marked * are "Ex div."

SMETHWICK GAS UNDERTAKING.

An interesting statement, illustrating the progress made in connection with the gas undertaking of the Smethwick Corporation, has just been issued. It shows that on the 1st inst. the number of houses in the borough was 14,885, of which 10,262 were supplied with gas. The number of meters fixed from the 1st of April to the 4th of November was 102 of the ordinary kind and 420 prepayment meters. The average number of the latter meters put in per month was 60, and of the former about 14. Complaint is made that it is impossible to get any assistance from some of the landlords, and the Council have been compelled to pass a special resolution with the object of enabling the Gas Department to reach many of the houses. As the result of a canvass now going on, it is hoped soon to reduce considerably the 4623 houses not supplied. The question of providing cheaper gas for cooking and domestic purposes has been considered by the Town Council; and as soon as the mains have been put into proper condition they will be prepared to afford the supply. A decrease in the consumption of gas to the extent of 7 per cent. on the past month's returns was attributed to the light weather experienced in the district, and to the absence of dark and foggy days. The stoppage of works through depression in trade has fortunately not at present had any material effect on the undertaking.

GAS PRODUCTION IN THE UNITED STATES.

In the "JOURNAL" for the 8th inst., brief reference was made to the above subject. We are now able to give, from our American contemporary "Light," some additional particulars taken from an advance chapter of the "Mineral Resources of the United States for 1907," prepared by Mr. E. W. Parker, the Chief Statistican of the United States Geological Survey.

The total quantity of gas produced at coal-gas and bye-product coke works in the United States last year, as reported by the 513 companies making returns to the Geological Survey, was 58,096,478,402 cubic feet, of which 3,399,680,509 cubic feet were lost through leakage, fire, or otherwise, and were reported as unaccounted for. The net quantity sold, therefore, amounted to 54,696,797,893 cubic feet, which was valued at $36,327,879, or an average of 66 c. per 1000 cubic feet. Statistics of this product for 1906 were not published by the Survey, but those for 1905 show that the total quantity of gas sold in that year was 40,454,215,132 cubic feet, valued at $32,937,456, or an average of 81·4 c. per 1000 cubic feet. Consequently, while the quantity of gas sold increased 14,242,582,761 cubic feet, or 35 per cent., from 1905 to 1907, the value increased only $3,390,423, or 10 per cent.; and the average price per 1000 cubic feet showed a decline of 15·4 c. This apparent decline is attributed chiefly to the greatly increased production of bye-product oven gas, most of which is used for fuel, and all sold at first hand at much lower rates than those obtained for gas produced in ordinary gas-works.

The quantity of gas sold for illuminating purposes in 1907 was approximately 30,033,971,443 cubic feet, valued at $22,990,040, or 77 c. per 1000 cubic feet; while that sold for fuel purposes was 24,662,826,450 cubic feet, valued at $13,337,839, or 54 c. per 1000 feet. In 1905, the quantity of gas sold for illuminating purposes was 26,817,836,022 cubic feet, valued at $23,138,361, or 86·3 c. per 1000 feet, and that sold for fuel purposes was 13,636,379,110 cubic feet, valued at $9,799,095, or 71·9 c. per 1000 feet.

The returns for 1907 show that Pennsylvania has superseded New York as the greatest producer and consumer of coal gas, largely as the result of the operations of the bye-product coke-ovens at Steelton and Lebanon. The production of coal gas reported from Pennsylvania in 1907 was nearly 9300 million cubic feet, about 80 per cent. of which was sold for fuel purposes. New York produced 8300 million cubic feet, nearly 5000 millions of which were sold for illuminating purposes. Consequently, while Pennsylvania's production exceeded that of New York by nearly 1000 million cubic feet, the value of the gas produced in New York exceeded that of Pennsylvania by $2,341,392, or 80 per cent. Massachusetts ranked third in the production of coal gas, with Ohio fourth, Michigan fifth, Illinois sixth, and Wisconsin seventh; all of these, with the exception of Ohio, having a larger production of coal gas on account of the operations of bye-product ovens. In the production of water gas, New York far outranks all the other States, with more than one-third of the total output. In the quantity of coal carbonized, Pennsylvania ranks first, New York second, Massachusetts third, Illinois fourth, Michigan fifth, and Ohio sixth.

How Electricity Profits are Shown at Cheltenham.—At the monthly meeting of the Cheltenham Town Council on Monday last week, the report of the District Auditor was presented. Among the criticisms passed by him on the accounts was one to the effect that the electric street lighting was still charged at the excessive rate of 3d. per unit, in order to show an imaginary profit on the electricity undertaking. Replying to this, Alderman Waghorne, the Chairman of the Finance Committee, said there were reasons which justified the Electricity Department in charging a sum for street lighting which would give them a profit. It was intended to apply a portion of it to a reserve fund, which was an object that ought to be encouraged from every point of view. It was idle to suggest that the amount set aside every year for the repayment of loans and the creation of sinking funds was sufficient to meet wear and tear and all the calls that might be made on capital account through the ravages of time; and the way now adopted was the only one in which a reserve fund could be built up. They could not come upon the rates every year for £2000 or £3000 for an electricity works reserve fund, but they could attain the same object by charging a higher price for current used for street lighting than that at which it could be supplied.

Important New Features

OF THE

"St. Andrew" Radiator

The "St. Andrew"

After prolonged experiments we have designed and perfected a plant for enabling us to manufacture—

A PUSH-NIPPLE OF MALLEABLE CAST-IRON

for assembling Radiator loops. This invention, which is our sole property, has permitted our making the nipple much thicker; at the same time it retains all the elasticity which has secured the absolutely tight joint characteristic of the steel push-nipple hitherto used, and is absolutely incorrodible.

All the "ST. ANDREW" Radiators are now assembled with this new push-nipple.

Another exclusive feature of the "ST. ANDREW" is the

NEW AIR VALVE—

which is more effective—more compact—neater in appearance—than the earlier pattern.

NOTE.—*Our Gas-Heated Steam Radiators are the only Radiators which can be had fitted with the Malleable Push-Nipple and the New Type of Air Valve.*

NEW WATER INLET

The earlier type of Radiators were filled through the Water Gauge. The present "ST. ANDREW" has a separate filling aperture, with dust-proof cap, while the Water Gauge is protected by an improved Nickel Plated Steel Protector.

Every part of the "ST. ANDREW" is now practically indestructible.

JOHN WRIGHT & CO., ESSEX WORKS, BIRMINGHAM.

202.

METROPOLITAN WATER BOARD.

The Annual Estimates.

At the Meeting of the Metropolitan Water Board last Friday, the Finance Committee presented their report on the estimates of the income and expenditure on revenue account for the year 1908-9.

The Committee reminded the Board that at the meeting on the 17th of July estimates of expenditure on revenue account and of income and expenditure on capital account were duly submitted and approved. They explained, however, that, owing to the revision of water charges as the result of the Charges Act as from April 1 last, it was extremely difficult at that time to forecast with any degree of reliability what the income would be from water-rental. The estimates of the income on revenue account were therefore postponed until later in the year, when some experience of the working of the Act would have been gained. The income for the year 1908-9 was now estimated at £2,852,350; and the expenditure, as voted in July last, at £2,930,780, resulting in an anticipated deficit of £78,430. The Committee therefore thought it right to point out certain circumstances which, in their opinion, should be borne in mind in considering the position as now presented. The Board would remember that the margin between income and expenditure in each of the years since the undertakings of the Companies were transferred had been but slender, the average annual surplus being £7431. In the year ended March 31, 1907, the surplus (if any) would have been much less but for the repayment to the Board of a considerable sum in respect of accommodation works executed for the London County Council; and in the year ended March 31 last, a deficiency would have occurred had it not been for the fact that a sum of £26,000 was credited in that year for rates and taxes refunded in respect of a previous period. In the estimates now under consideration, provision had to be made for an increase in the allowances for empty houses of no less than £12,658; the sum provided under this head being £144,250, compared with the amount actually allowed in 1907-8 of £131,592. This continual increase in the number of empty premises was an experience common to most of the Local Authorities within the Board's area; and it had a serious effect upon the Board's income. The Committee called attention to the sum now payable for debt charges; the estimated increase under this head amounting to £40,324, due, of course, to the large amount which the Board had had to borrow. In considering this expenditure, it might be interesting to point out that the Board were in effect continuing to pay the large dividends received by the shareholders of the Companies. This fact appeared to be frequently overlooked in comparing the working of the Board with that of the Companies. [The Committee submitted some tabulated particulars in support of this statement.] It should be borne in mind, they said, that the dividends paid by the Companies were fluctuating; whereas the interest now paid by the Board was not only fixed, but was also guaranteed on the highest possible security. It must be remembered, too, that the Board had to bear the full charge for interest in respect of new works undertaken by them in order to make provision for future requirements. The Committee concluded by recommending that the estimate for the year ending March 31, 1909, amounting to £2,852,350, be approved.

The Chairman of the Committee (Lord Welby), in moving the adoption of the recommendation, said that in 1907-8 the actual total income was £2,847,197, and the expenditure £2,846,264; leaving a surplus of £933. The total net income for 1908-9 was estimated at £2,852,350—an increase of £5153 compared with the actual income of the previous year. The interest of the Board was naturally directed to the cardinal item of their revenue—viz., the water-rental. In 1907-8 the gross water-rental was £2,904,694, whereas the estimated gross rental for 1908-9 was £2,943,240—an increase of £38,546. When they came to the net water-rental, they found that it was very much diminished on account of the Charges Act and of the increased allowances for empty houses. The result of this was that the net rental for 1908-9 was estimated at £2,762,740, while the actual net rental for 1907-8 was £2,752,179; thus reducing the increase in the gross rental to £10,561. It was an ominous sign that they found a distinct decrease in the quantity of water consumed for building purposes, which meant a decline of building within the water area. But a much larger question arose with regard to the empty houses, which last year were responsible for a loss of £144,000. In presenting the estimates in July last, it was his unpleasant task to inform the Board that the Finance Committee were very much afraid that there would be a deficit. They now estimated the income of 1908-9 at £2,852,350, and the expenditure at £2,930,780, leaving a deficit of £78,430, and showing an increase of £84,516 compared with the actual expenditure in 1907-8 of £2,846,264. This was accounted for by the following items of increased expenditure as compared with 1907-8: Debt charges, £40,000; rates and taxes, £38,000; and contingencies, £6339. The deficit was a matter of grave concern. If the rates had not been relieved by a refund of £26,000, there would have been a deficit last year. In conclusion, Lord Welby said a strict scrutiny of the Board's expenditure was imperative, and the time had come for a close revision of their establishments, so as in no way to overstep what was necessary for carrying out all their arrangements. The Board had also given sanction to a firm of leading accountants to examine the system of accounts and report as to whether they considered it sufficient and efficient.

After some discussion, the recommendation was adopted.

Charges of the Metropolitan Water Board.—At the last meeting of the Hammersmith Board of Guardians, it was duly decided to leave in abeyance for six months a scheme for sinking an artesian well in order to obtain water for the supply of the Workhouse and Infirmary. Mr. J. C. Platt, the Chairman, in moving that the scheme be deferred, said the original charges made by the Metropolitan Water Board upon the Guardians amounted to about £700 per annum; but the Board had now decided to lower them by £175, which was practically 20 per cent. reduction.

Bijou.

A Non-Party Question.

CONSERVATIVES & LIBERALS

B. Burner.

In Complete Unity of Agreement

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Read the following Extracts from Letters:—

From James Sharpe, Secretary,
Stroud Green Conservative Club,
Stapleton Hall, N.

I have much pleasure in informing you that my Board of Directors are very satisfied with the **Bland** Burners which you fitted to our Two Billiard Tables.

From W. Gavazzi King,
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I am pleased to add my testimony to the **Bland** Burner. It has exactly halved my gas bill and reduced the cost of Mantles by three-fourths.

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For full particulars of these celebrated Inverted Gas Burners for CHURCH, FACTORY, SHOP, CLUB, or DOMESTIC LIGHTING, write:—

THE BLAND LIGHT SYNDICATE, LTD.,

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A. No. 6.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

This has been a week of great activity in Edinburgh upon gas matters—somewhat out of the usual run. On Monday evening there were two papers upon petrol gas read before the Royal Scottish Society of Arts; and as it is not unlikely that this gas will become a powerful competitor with coal gas in suburban districts, and a far more powerful competitor with electricity in country districts, it is worthy of consideration. The theoretical price given in the papers is very low—probably lower than will be found possible if the gas be adopted upon anything like an extensive scale. But, unless the price of petrol should become prohibitive, it will always be possible to produce the gas at a cheap rate, because capital charges will be low, and establishment charges practically *nil*. This is a feature of the business which cannot be overlooked, because it may come to pass that business premises and the better class of dwellings in cities, where room can be found for the generating plant, will be lighted with petrol gas.

The paper on sulphur compounds in coal gas, read before the Pharmaceutical Society on Wednesday evening (see p. 833.), and the discussion upon it are of a different class. The views of the authors of the paper need not be taken too seriously. The class of professional gentlemen whose function it is to look to the health of the inhabitants of this planet are prone to finding mares' nests, as the pages of the "Lancet" from time to time testify. The conclusions of Mr. Dott and his colleague may without hesitation be placed in this category. They found two articles near to each other—a gas-stove and an arm-chair. There was sulphur upon the chair; and therefore it must have been deposited there by the fumes thrown off by the gas-stove. The diffusion of gases did not seem to have entered into their heads, otherwise they could not have escaped the necessity for inquiry as to whether the side of the chair farthest from the gas-fire did or did not also show traces of sulphur, as well as other articles in the room. The true conclusion would seem to be that there was something in the composition of the chair covering which, when exposed to heat, produced the sulphur. But these gentlemen, closing the doors of their minds to other possibilities, and assuming that the gas was at fault, proceeded to burn gas in a manner which was certain to produce sulphuric acid; and, having found it, they hastened to proclaim that as much as three tons of sulphuric acid are every year thrown into the atmosphere of Edinburgh from the gas burned in the city. Even if it were, three tons of sulphuric acid would not paint the pavement upon one side of Princes Street; and if it were all applied in one day—probably every day in the year—nobody would be a bit the worse in health. If the paper was loosely constructed, the discussion upon it was more so. Indeed, it was puerile, and revealed the nakedness of the intellectual accomplishments of pharmacists upon work-a-day problems. Half-an-hour's consultation with a chemist in a gas-works would have dispelled the theories or fears of the authors, and would have saved them from making an exhibition of their ignorance regarding the subject upon which confessedly they are only beginning their studies.

The following statement, which was published in the "Dundee Advertiser" on Wednesday, is of some interest: "The question of responsibility for the custody of meters engaged the attention of the Dundee Gas Committee last night. The Town Clerk intimated receipt of a communication from the Gas Treasurer stating that the proprietor of a tenement in Loons Road had refused to sign the application form for a meter on the ground that the Commissioners could not legally ask him to become responsible for any damage done to the instrument. The Town Clerk expressed the opinion that it was legal for the Commissioners to insist on such an undertaking. Mr. Girrity said he had taken advantage of his position not to sign the form. Mr. Burke: Are you the proprietor? Mr. Girrity: I am. Proceeding, he said he had taken up this position because of the complaints that were being made by penny-in-the-slot meter users. They charged these poor people not only for the money abstracted by a thief, but also held them responsible for the damage done to the meter. In such a case, he argued that responsibility should be assumed by the town, and not rest on the householder. He moved accordingly. Mr. Speed held a similar view. Bailie High moved the previous question, remarking that any pronouncement of the kind would simply be putting a premium on theft. Mr. Burke said that the Gas Treasurer exercised discretion in cases of the kind, and that the charge was not exacted where there was a genuine case of burglary. In the bulk of cases the thefts were committed by members of the household. During last year, it was reported, there occurred 275 thefts from slot meters; the sum stolen being £32. The damage done by the depredators amounted to £13; so that the total loss amounted to £45. Mr. Burke: And there were convictions in only a few cases. Mr. Reid: That is so. During last year 2 per cent. of the meters were broken into. If you remove the responsibility of tenants, it will rise to 20 per cent. On a vote, Mr. Girrity's proposal was negatived by 14 votes to 3."

In the Town Council on Thursday, Treasurer Soutar, in reply to Mr. Girrity, explained that previous to eighteen months ago no accounts were issued for damage to meters and for money abstracted; but since then consumers had in every case had to pay for these, or the amount was kept off the rebate. In many cases the meter was broken open by one of the family. In one house the meter had been opened three times since the beginning of October. The Gas Treasurer had followed the practice of writing off the deficiency where convictions had been obtained. There were comparatively few convictions. As to the guarantee forms for ordinary meters, he pointed out that if they were unstamped, and the guarantors were asked to pay, they refused on this ground. They were further advised that for every unstamped agreement they were liable in a penalty of £5. Consumers had the option, by Act of Parliament, of giving security by deposit, upon which 3 per cent. interest was allowed. Mr. Girrity said the practice was to charge people whose money was stolen, and who knew nothing

THORP'S

COMBINED ANTI-PULSATOR AND GOVERNOR

LARGE ANTI-PULSATOR AND GOVERNOR FOR 10-inch CONNECTIONS.

(PATENTED).

Installations at work on all sizes of Mains and Engines.

Prevents pulsations in Mains.

Delivers Gas at a fixed pressure.

With Gas Engines is a safeguard against neglect.

Ensures that each induction stroke of Engine shall be equally effective.

Write *re* your difficulties and we will promptly reply.

T. G. MARSH,
28, Deansgate,
MANCHESTER.

about it. He moved that it be an instruction to the Gas Treasurer not to charge consumers for money abstracted from meters, if he was satisfied that it was not their fault. Mr. Speed seconded the motion. Mr. J. Reid, the Convener of the Gas Committee, moved the previous question, which was seconded by Mr. W. F. Burke. On a division, Mr. Reid's motion was adopted by 15 votes to 6.

The Council then took up the subject of the lighting of common stairs by electricity, to which I referred last week. Mr. Burke pointed out that it was proposed that the Council should offer to fit up electrical installations on common stairs, at the expense of proprietors, on order that they might compete with, and cut the throat of, their own Gas Department. He held that before they embarked upon a scheme of this kind they should make provision for the proprietors keeping the installation in for such a time as would pay the capital charge and interest. He moved that the proposal be sent back to the Committee. Mr. Don moved approval of the proposal. Eventually the Council, by 16 votes to 10, sent the proposal back for further consideration.

The annual festival of the Lighting Department of the Dundee Corporation was held last night, with Mr. A. Yuill, the Gas Engineer and Manager, in the chair. In the course of a short address, he said that he considered that if every lamplighter were given a certain number of lamps to look after, instead of different men cleaning and lighting the lamps, a spirit of emulation would be raised among the men, and the lamps would be kept in a better condition. Part of the proceedings consisted of the presentation of a medal, the gift of the proprietors of the "People's Journal," and of a purse of sovereigns subscribed for by his fellow-employees, to Robert Ogilvie, who, at 77 years of age, has completed fifty years' service in the Lighting Department, and is still in their employment. Mr. J. Reid, the Convener of the Gas Committee, made the presentations. Mr. Ogilvie had, he said, served under five Gas Managers. When he began his career, there were only twenty lamplighters in Dundee, and the lights were of the old rat-tail type, which were now confined to the lighting of back stairs. The lighting staff had since that time been greatly increased; and there were now about 5800 lamps in the city.

The Under-Secretary for Scotland has written to the Corporation of Wishaw, drawing attention to the abstract of their accounts, and asking what they propose to do in regard to several items—among others, the deficiency upon the gas account, owing to the sum charged upon it on account of the electricity undertaking. The Council were asked whether they proposed to levy a guarantee rate to liquidate the deficiency. The letter was sent to the Gas Committee for consideration and report.

In the Kirkcaldy Town Council on Monday it was reported that Treasurer Kilgour had moved, in the Gas Committee, that while the general feeling of the Committee seemed to be in favour of purchasing the gas undertaking, no resolution to purchase should be come to in the meantime, until some approximate statement was laid before the Committee as to what would be the probable financial results. He also moved the appointment of a Committee to prepare such a statement, and also to consider and report as to which Act of Parliament might be utilized to carry out the purchase, and any other questions upon which they might consider it desirable to report. At a subsequent meeting of the Committee, Treasurer Kilgour explained that it had been found impracticable to prepare the report without expert advice, and that he had consequently, after consultation with the Convener, asked the Town's Auditor—Mr. R. Cockburn Millar, of Edinburgh—to prepare the statements. A hot discussion ensued in the Council upon the method of calling the Committee together, and also as to the authority for the appointment of Mr. Millar; and, by a majority, the subject was sent back to the Committee, but with powers.

An alarming explosion in a manhole connected with the supply of electricity occurred in George Street, Aberdeen, on the forenoon of Tuesday of this week. Beside the manhole there is an electric street-lamp. A man was cleaning and adjusting it, and in the course of his duties he turned on the light. It is surmised that when he did so a spark, generated by the switching operation, fired an accumulation of gas which had gathered in the manhole and ascended to the lamp. Workmen had been engaged laying a telephone cable at the place; and it is believed that in their work they had damaged a gas-pipe. A man had his foot upon the cover of the manhole at the time it was thrown up, and he was hurled half-way across the thoroughfare, and severely shaken and bruised. A boy who was passing by was thrown down by the force of the explosion, and was burned by the flames which flashed up when the cover rose.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Dec.* 19.

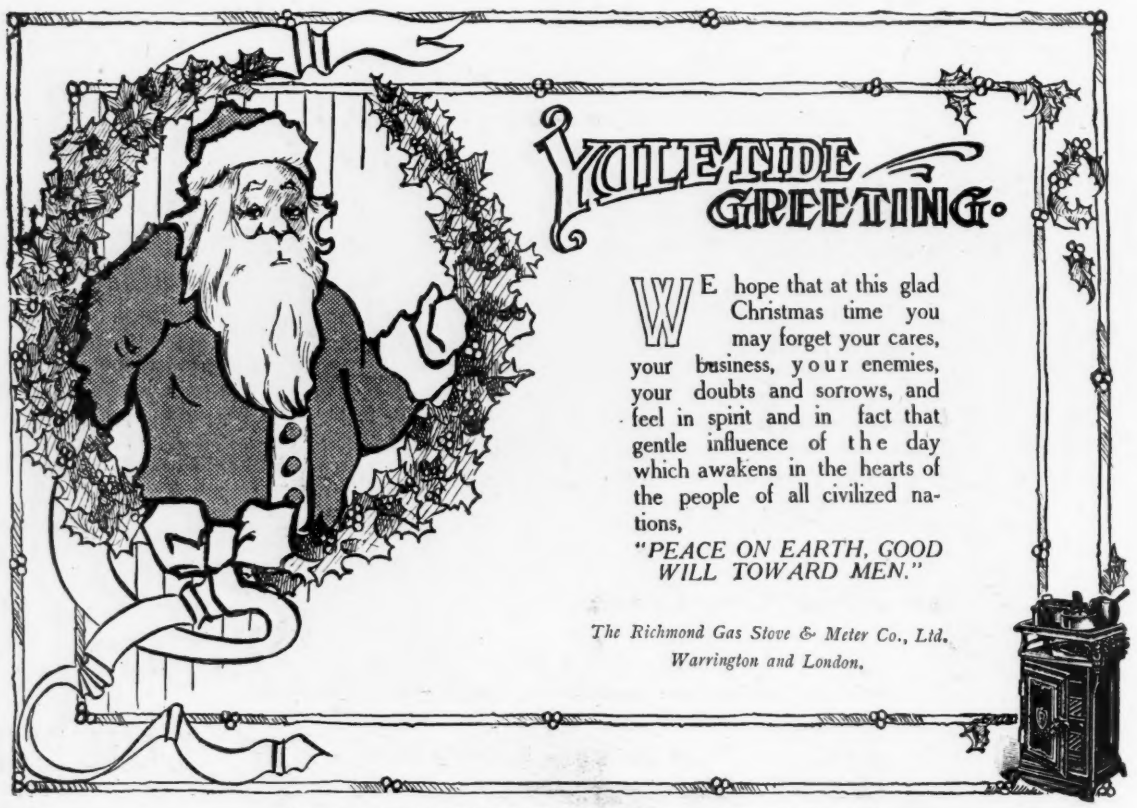
Demand has improved as the week has progressed, and supplies offered have been readily placed at gradually hardening prices; so that at the close quotations are £11 per ton f.o.b. Hull, £11 2s. 6d. per ton f.o.b. Liverpool, £11 3s. 9d. to £11 5s. per ton f.o.b. Leith. There has also been good inquiry for delivery ahead; but the firmness of makers has restricted business. Sales have, however, been made for delivery over the early months of the year at £11 5s. per ton f.o.b. shipping port. This price about represents buyers' ideas over the first half of the year; but sellers require a higher premium.

Nitrate of Soda.

The market is quiet, with quotations unchanged at 9s. 7½d. per cwt. for 95 per cent., and 9s. 10½d. per cwt. for refined quality, less 2½ per cent discount.

Tar Products. LONDON, *Dec.* 21.

Pitch has been depressed throughout the past week, and what business has been done has taken place at low figures. There have been no actual transactions in London; but it is doubtful whether pitch at this place is worth anything over 18s. 6d. per ton for delivery to the


YULETIDE GREETING.
WE hope that at this glad Christmas time you may forget your cares, your business, your enemies, your doubts and sorrows, and feel in spirit and in fact that gentle influence of the day which awakens in the hearts of the people of all civilized nations,
"PEACE ON EARTH, GOOD WILL TOWARD MEN."
The Richmond Gas Stove & Meter Co., Ltd.
Warrington and London.

Advertisement of the RICHMOND GAS STOVE & METER CO., LTD.

London Offices and Show-Rooms: 132, Queen Victoria Street, E.C. *General Offices and Works: Warrington*

end of June next. On the east coast, business has been done at 18s. per ton for near delivery. On the west coast, 18s. 3d. f.a.s. Liverpool has been accepted for some quantity for January-June delivery; but it is reported that some manufacturers had to decline this price, and that they have none for sale. On the Continent, business has been done at equal to 18s. England for delivery over next year. Creosote is very firm; and the value in London remains unchanged. Some makes could be secured for immediate delivery at 2¾d.; but the majority of the manufacturers are asking 2⅞d., while for forward delivery 3d. is quoted. In the Midlands, the market is firm, and prices are unchanged. In the North, some quantity of oil is stated to have been sold *ex* works Liverpool at 2½d.; but this is certainly very cheap, and appears to be under the market value. Sales are reported to have been made in the Lancashire district on a basis of 2⅞d. delivered Manchester. Benzol, 90 per cent., is quiet, and sales have been made at 6d. in the North for prompt delivery. Fifty-ninety per cent. benzol is a little easier, and 7d. has been accepted in the North f.o.b. for delivery to the end of March. Toluol is still in fair demand, especially for delivery all over next year. Solvent naphtha is firm, but there has been no increase in price. Heavy naphtha is quiet. Carbolic acid is decidedly weak, and 1s. has been accepted on the east coast for prompt delivery. Crystals are very dull, and there are sellers at 4d. f.o.b., packages included, for 39-40's. Naphthalene is dull, and stocks are heavy. Creosote sales are quiet but steady.

The average values during the week were: Tar, 10s. 9d. to 14s. 9d., *ex* works. Pitch, London, 18s. 6d.; east coast, 18s. to 18s. 3d.; west coast, 17s. 3d. to 18s. 3d. Mersey ports, 17s. 6d. to 17s. 9d. others. Benzol, 90 per cent., casks included, London, 6½d.; North, 6d.; 50-90 per cent., London, 7½d. to 7⅝d.; North, 7d. to 7¼d. Toluol, casks included, London and North, 9d. to 9½d. Crude naphtha, in bulk, London, 3⅝d. to 4d.; North, 3½d. to 3⅝d.; solvent naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d.; heavy naphtha, casks included, London, 11d. to 11½d.; North, 10d. to 10½d. Creosote, in bulk, London, 2⅝d. to 2¾d.; North, 2⅝d. to 2¾d. Heavy oils, in bulk, 3d. to 3½d. Carbolic acid, 60 per cent., casks included, east coast, 1s. to 1s. 0½d.; west coast, 11⅜d. to 1s. Naphthalene, £3 10s. to £6 10s.; salts, 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

The market has been very firm throughout the past week, and prices have hardened daily; closing at least 5s. up on quotations at the beginning of the week. The principal Gas Companies quote £11 10s. for forward delivery; while ordinary makes cannot be secured upon Beckton terms at under £11 to £11 2s. 6d. In Hull, business has been done at prices varying from £11 2s. 6d. to £11 5s.; while for one of the best makes £11 7s. 6d. has been paid for end of January shipment. In Liverpool, £11 3s. 9d. to £11 6s. is the value. In Leith, prices vary from £11 6s. to £11 10s.; and the latter has been declined in several instances for forward delivery.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a very strong demand for coal; and as production is heavy, the shipments are extremely large, more especially of gas coals. In the steam coal trade, there is activity for this season of the year; and the prices have steadied. Best Northumbrian steams are from about 10s. 7½d. to 10s. 9d. per ton f.o.b., second-class steams 9s. 9d. to 10s. 3d., and steam smalls steady at from 4s. 9d. to 6s. The production of gas coals is at its highest; the shipments now being at the maximum, especially for the great users on the Thames. Durham gas coals are quoted from about 9s. to 10s. per ton f.o.b. for the usual qualities, and up to about 10s. 9d. for "Wear specials." There are few contracts to report; and some of the chief collieries seem to have decided to keep something like the present prices—which buyers ask for concessions from. The sales to the Mediterranean have been full, and will claim heavy shipments in January. Prices appear promising for the next two months. The contracts for gas coal for Stockholm are fixed—for about 120,000 tons of Durham coals—and some 12,000 tons have also been placed for Gothenburg. The prices cannot yet be definitely stated, but it is probable that somewhere near 9s. per ton is the f.o.b. figure. Coke is steady, foundry kinds being from 17s. to 18s. per ton f.o.b. Gas coke is more plentiful, and is about 14s. per ton f.o.b.

Scotch Coal Trade.

Trade does not improve. Both ell and splint are more difficult to sell; and it is reported that prices are, if anything, easier, particularly for prompt delivery. Steam coal is offered freely, the supply being greater than the demand. Treble nuts are in good request, but other small sorts are not wanted. The prices quoted are: Ell 9s. 9d. to 10s. 6d., splint 10s. 6d. to 10s. 9d., and steam 10s. to 10s. 3d. per ton f.o.b. Glasgow. The shipments for the week amounted to 295,780 tons—an increase of 3359 tons upon the preceding week, and of 27,219 tons upon the corersponding week of last year. For the year to date, the total shipments have been 14,015,022 tons—a decrease of 147,026 tons upon the corresponding period of last year.

Gas Question at Biddulph.—The decision of the Biddulph Gas Company to apply for statutory powers has made "gas" the question of the hour in the locality; and a public meeting has been the outcome. At this it was resolved that the time had arrived when it was "necessary that the supply of gas should be vested in the hands of the Council," who were urged to oppose the Company's application to Parliament. It may be pointed out that for several years the subject of the public lighting has agitated the Council, who this season, failing to come to any satisfactory arrangement with the Gas Company, approached the Congleton Corporation, with a view to ascertaining upon what terms they would be willing to light the streets of Biddulph; and the Corporation are now taking steps in this direction.

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LEST YE FORGET.

Dover Gas-Works Reading and Recreation Room.

There was held last Tuesday the "Coming of Age Anniversary" Smoking Concert in connection with the Dover Gas-Works reading and recreation room. A large party assembled; and as a souvenir to specially mark the occasion, each member is to be presented with a handsome wrought medal in a case. The President (Mr. R. Herring) occupied the chair, and was supported by Mr. Willsher Mannering, the Chairman of the Company, Mr. J. Robson, the Deputy-Chairman, Mr. W. W. Burkett, a Director, and Mr. E. C. Herring, the Vice-President. During the toast-list musical honours were freely accorded; and among the recipients may be mentioned Mr. H. Harman, the Hon. Secretary, who has acted in this capacity since the opening of the room. Some well-chosen words of advice were given to the members by the President, who impressed upon them the duty of remembering that it was by the kindly help of the Directors that he was able to establish the room; and he was proud to be there with them all at its "coming of age" celebration. Mr. Mannering, in proposing the health of their President, spoke in flattering terms of the keen interest Mr. Herring always took in the welfare of the employees, and said the Directors were pleased to give every support to any movement or institution such as this, which would promote a good understanding between master and men. In concluding, he asked the workmen to always endeavour to give to Manager and Directors their loyal co-operation. Mr. Robson and Mr. Burkett also addressed the members; and an excellent musical programme was gone through.

Preston (Hull) Water Supply.—Last Friday week, Mr. W. O. E. Meade-King held an inquiry at Preston (Hull) into an application made to the Local Government Board by the Rural District Council of Sculcoates to borrow £17,000 for the purpose of affording a water supply to the parish of Preston. There was no opposition to the scheme, which provides for a supply of water from the mains of the Hull Corporation, for which a provisional agreement has been entered into. The official representatives of the various authoritative bodies attended; and Colonel Wellsted gave a *résumé* of the history of the water question at Preston.

Serious Gas Explosion at Padstow.—An almshouse at Padstow was almost completely wrecked by an explosion of gas which occurred yesterday week. The accident appears to have been caused by the main in front of the row of houses being fractured by the passing of a heavy brewers' dray, and the escaping gas being ignited at the fire in the house. The roof of the building was blown off, the window and front wall forced out, and the other walls distorted. Fortunately, the aged occupant of the house was absent; but the explosion caused great alarm, which was increased when two further explosions occurred. The officials at the works then turned off the gas in the main and prevented further damage.

Epsom's Electricity Losses.

Some significant facts were brought out regarding the Epsom Urban District Council's electricity undertaking in the course of a Local Government Board inquiry held by Mr. H. R. Hooper. The inquiry took place as the result of a desire expressed by the Council to borrow a further sum of £1500 for the purposes of the undertaking. At the outset, information regarding the capital expenditure, &c., which the Inspector asked for was not forthcoming; and ultimately the inquiry had to be adjourned so that the particulars might be got together. Before this stage was reached, however, the Electrical Engineer (Mr. H. F. Foster) had been subjected to a pretty sharp examination, from which he cannot be said to have emerged triumphant. The Inspector, after remarking that more current was being sold for public than for private lighting, said the undertaking had been losing a very great deal for a very long time—in fact, ever since it had been started. The Engineer: It is a diminishing figure. The Inspector: £1913 lost last year. That is hardly a diminishing figure. The undertaking has been running for six years. During that time it has lost £5643, as far as I can ascertain from the figures I can get. Last year the loss went up again. What is the reason and explanation of this loss? The Engineer said the deficit was accounted for by the slow patronage for current and competition with the Gas Company. He said they had had rather a bad advertisement in the fact that the undertaking had not been supported by the Council generally. The Inspector said he wanted the capital expenditure on public lighting. The Engineer: That is included in the total expenditure on public and private lighting together. The Inspector: Then do I understand you are unable to tell me the capital expenditure on public lighting? The Engineer: I have not dissected it yet. The Inspector: Are you losing money on private lighting? The Engineer: No. The Inspector: Are you losing on public lighting? The Engineer: No. The Inspector: Well, what are you losing on? The Engineer: The total expenditure is less than the total revenue; and therefore we are making a gross profit. The Inspector: You must disabuse your mind of gross profit. This undertaking has to pay for its money. On what are you losing? What I want to know is whether the price you are charging is sufficient or insufficient. What is the prospect before the undertaking? The Engineer: We are suffering from an insufficient number of consumers. The Inspector remarked that when they did not know what their capital expenditure had been in regard to supply, he did not see how they could make out what the charge should be.

Threatened Opposition to the Yorktown and Blackwater Bill.—The Yorktown and Blackwater Gas Company's Bill is to be opposed by the Wokingham Town Council, unless all reference to Wokingham Without is excluded from the areas specified in the application. The Council propose to take the necessary steps to extend their gas undertaking as soon as possible.

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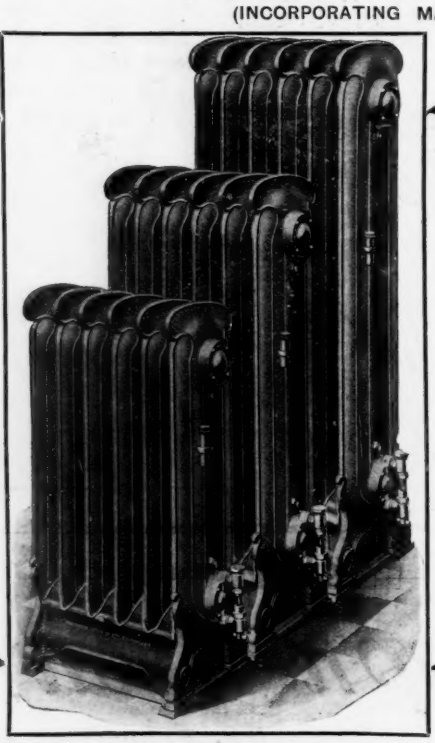

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Seaford Council and the Gas Company.

The Seaford Urban District Council have adopted a report of the Sanitary and Lighting Committee, in which the Committee recommended that notice be served on the Gas Company that the arrangements made in November, 1906, be terminated at the end of three months, and the following arrangements substituted: The Gas Company to lay new lamp-services not exceeding 15 feet in length from main to meter free of cost, extra length beyond 15 feet to be paid for by the Council; no road-opening fees to be charged by the Council to the Gas Company for any openings in connection with any lamp-service—new, alteration, renewal, or searching for leaks; the whole of the work to be done by the Gas Company. The Company, in their letter, offered to reduce the price of gas, after the Christmas readings, to 3s. 10d. per 1000 cubic feet net, if the account be paid within a month of quarter day; if not, 5 per cent. interest to be charged. If the Council used town gas only for the new pumping plant, the Directors would make a further concession of 2d. per 1000 feet upon all gas consumed by the Council, making the net price 3s. 8d. per 1000 cubic feet. In the event of a reduction in the present price of 4s. 8d. per 1000 cubic feet to the public, a reduction would be allowed to the Council in ratio. The Committee recommended that the Company be informed that, as the Local Government Board had the application for steam power for the new pumping plant, the Council were unable to consider the offer of 3s. 8d. per 1000 cubic feet until the Board had decided upon the matter. They also recommended that the offer of the Company to supply gas at 3s. 10d. per 1000 feet net be accepted, and that no fees for road opening be charged if the Company will enter into an agreement to repair and maintain any trench they may open. The Council were asked to agree to the charge of 5 per cent. on overdue accounts, subject to the condition that the Company render their accounts on or before the first Monday in the month after quarter day. These arrangements are to be terminable by either party at six months' notice from any quarter day. The Company's offer to provide and fix average meters on instalment purchase terms was recommended for acceptance. One of the members remarked that the Company had met the Council very fairly.

The South Staffordshire Water Company and their Pumping Operations.—At the last meeting of the Lichfield Rural District Council, the Chairman (Mr. H. W. Gardner) reported that since the last meeting he had had an interview with Sir Alfred Cripps, K.C., with respect to the pumping-stations of the South Staffordshire Water-Works Company and the drainage of the water from the land of the district. The learned Counsel strongly advised that application should be made for an injunction against the Company. He therefore proposed that their Solicitors should be instructed to institute proceedings against the Company for an injunction to restrain them from continuing operations at the pumping-stations erected by them at Brindley Heath, Seven Springs, and elsewhere, and from proceeding with their pumping-station at Maple Brook. The motion was unanimously agreed to.

Serious Water Famine in Vienna.

Writing last Wednesday, the Vienna Correspondent of the "Pall Mall Gazette" said: "Three-fourths of the houses in Vienna are now without water, and the remaining fourth will be in the same plight before Christmas. The city is suffering from a water famine, due to the almost unprecedentedly dry weather of the last five months. For weeks at a time, not a shower of rain fell; and the supply of water in the reservoirs decreased alarmingly. Now, unless heavy rains come very speedily, the citizens will have to put up with a scarcity of water during the whole winter. In normal seasons, Vienna enjoys a supply of very fine cold pure water, brought from the Alps some 80 or 100 miles away. Seven years ago, the city had grown very nearly to the capacity of the service, and the City Council undertook the construction of a second aqueduct, also from the Alps, about 120 miles distant. Several million crowns were appropriated for the purpose; but, unfortunately, a large proportion of the sum was diverted year by year for more ornamental, but less useful, purposes, such as the creation of small parks and the erection of monuments and fountains. Meanwhile, the population was increasing at the rate of 40,000 a year, and the water supply was no larger. More than once in the past two years the reservoirs have fallen very low; but the present drought has brought about a really grave condition. Some weeks ago the authorities began cutting off the supply in the private houses; leaving only one tap in the basement to supply 'flat' buildings containing from 4 to 24 suites of apartments. Now 18,000 houses are practically without water, and the remainder are being cut off at the rate of 800 a day. As the work of constructing the new aqueduct cannot possibly be finished before the end of 1910, the future outlook is very gloomy."

New Companies Registered.—The Barbados Gas Company has been registered, with a capital of £10,000, in £1 shares; and the New Gas and Lighting Development Syndicate, with a capital of £2000, in £1 shares.

Cresswell Water Supply.—Cresswell, on the borders of Derbyshire and Nottinghamshire, is one of the rapidly increasing villages of the Bolsover Colliery Company, who recently set themselves the task of making a world's record in coal turning. The record quantity raised in twelve hours from the Mansfield pit was 4639 tons 19 cwt., and for the same day from three of the Company's pits the total output exceeded 10,000 tons. The increase of the colliery population at Cresswell has been such that the district is applying for urban powers, and it has also rendered necessary a fresh source of water supply. The Rural District Council have succeeded in arranging for a supply of water in bulk from the Duke of Portland's private water-works pumping-station, about five miles distant, and have also instructed the Duke's Engineers, Messrs. G. & F. W. Hodson, of Loughborough, to prepare a scheme for the distribution of the water in Cresswell.

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Gas for Destructor Lighting at Acton.

At the last meeting of the Acton Urban District Council, the recommendation of the Works Committee, that gas be installed at the dust destructor in preference to electricity (*ante*, p. 715), came forward for confirmation. Mr. Baldwin moved that the Council adopt electricity; observing that the motion of the Committee in favour of gas had been carried by those who had done their best to wreck the electricity undertaking. Mr. Boissonade, in seconding, remarked that it seemed absurd to light a building by gas when it was next door to the electricity generating station. The Vice-Chairman said it was not a question of wrecking the undertaking, but of saving the ratepayers' money. Mr. Parkinson declared that the Council had no right to help their undertaking at the expense of the ratepayers. That which was the cheaper and more efficient should be accepted; and he favoured gas. Mr. Eydmann also said gas was cheaper than electricity, and gave a better light. The amendment in favour of electricity, on being put, was lost by 8 votes to 7. Mr. Baldwin then moved that the matter be again referred back to the Committee, so that the whole of the Engineer's report, instead of a summary of it, might be placed before the Committee for consideration. It was pointed out by Mr. Shillaker that if the Council were going to sell the undertaking—though he was opposed to such a course—it was to their interest to put it in as flourishing condition as possible. Finally the question was referred to the next Council meeting, in order that all the members might be supplied with a copy of the report.

Suicide by Gas at Barking.—A Barking man, named Carter, who was with his wife found suffocated by gas, was thoughtful enough, before turning on the tap, to post up the following notice where it would be at once seen on entering the house: "Do not carry a light going upstairs into the front room." Deceased, who had been out of work a good deal, was only 23 years of age; his wife being nine years older. The room in which they were found was full of gas; and they were both dead in bed. The burner had been taken off the gas-fitting; and the two windows were carefully stopped up.

Electricity Losing Ground at Finchley.—At the last meeting of the Finchley District Council, Mr. Todd referred to the fact that many shopkeepers in the Broadway were substituting gas for electricity. He remarked that this was a serious matter for the electricity undertaking, and said he should like to hear what the Chairman of the Electricity Committee had to say. The gentleman addressed replied that he did not know why tradesmen were doing as Mr. Todd had stated. He believed, however, that after a little experience they would find gas more costly than they anticipated. Mr. Nicholls asked if the Electricity Committee were alive to the competition they had to face in the North Middlesex Gas Company. It might be a trifling matter at that meeting, but it would become a serious one if this undertaking lost a large number of customers. What the consumers said was that the electric light was poor, and too dear. The matter must be faced.

During the sitting of the Horsham County Court last Tuesday, inconvenience was caused by the sudden failure of the electric light, which, however, fortunately re-appeared in a few minutes.

The South Hants Water Company have applied to the Board of Trade for powers to erect an aqueduct across the River Hamble, near the Bursledon toll-bridge; a greater supply of water being needed in the immediate district.

The Finance Committee of the Portsmouth Borough Council have under consideration the necessity of increasing the number of gas-testing stations, in order to ascertain whether the statutory illuminating power is maintained in the several districts of the town.

The town employees of the Scarborough Gas Company held their annual social gathering on Friday, the 11th inst., at the Belle Vue Hotel, Westborough. The evening's programme commenced with a whist drive, followed by a concert under the chairmanship of Mr. Alexander Allan, the Engineer and Secretary of the Company. Excellent selections were rendered on the gramophone, kindly lent and manipulated by Mr. Allan. The artistes were all well received; and after a vote of thanks to those who had officiated, a pleasant evening was brought to a close.

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